

10/10/2011

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1214834 - R8 SDMS



Third West Weekly Report 9/26/11 - 9/30/11

Shepherd, Michael

to:

Joyce Ackerman, 'Craig Barnitz (cbarnitz@utah.gov)'

10/10/2011 08:12 AM

Hide Details

From: "Shepherd, Michael" <Michael.Shepherd@PacifiCorp.com>

To: Joyce Ackerman/R8/USEPA/US@EPA, "'Craig Barnitz (cbarnitz@utah.gov)'"  
<cbarnitz@utah.gov>

#### 6 Attachments



Third West Weekly Log 2011-39.pdf Weekly Report 9-26-11 to 09-30-11.pdf 221469-1.pdf 221575-1.pdf 221773-1.pdf



221950-1.pdf

Joyce & Craig,

Attached are the air monitoring results for 9/26 – 9/30. All results came back negative, except for the 1 hit on 9/26/11 of chrysotile previously reported.

Also attached are the environmental audits, daily checklists (Weekly Report 09-26-11 to 09-30-11) and construction activities for this timeframe (Third West Weekly Log 2011-39).

Please let me know if you have any questions.

Thanks,

Mike Shepherd  
Project Manager  
Rocky Mountain Power - Major Projects  
801.220.4584 Office  
801.631.1310 Cell  
801.220.2797 Fax  
[michael.shepherd@pacficorp.com](mailto:michael.shepherd@pacficorp.com)

**REI LAB** ***Reservoirs Environmental, Inc.***

October 4, 2011

Laboratory Code: RES  
Subcontract Number: NA  
Laboratory Report: RES 221773-1  
Project # / P.O. #: None Given  
Project Description: 3rd West Sub Rocky Mtn.  
Power

David Roskelley  
R & R Environmental  
47 West 9000 South #2  
Sandy UT 84070

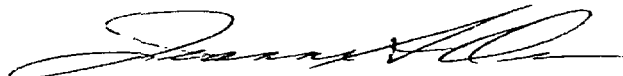
Dear Customer,

Reservoirs Environmental, Inc. is an analytical laboratory accredited for the analysis of Industrial Hygiene and Environmental matrices by the National Voluntary Laboratory Accreditation Program (NVLAP), Lab Code 101896-0 for Transmission Electron Microscopy (TEM) and Polarized Light Microscopy (PLM) analysis and the American Industrial Hygiene Association (AIHA), Lab ID 101533 - Accreditation Certificate #480 for Phase Contrast Microscopy (PCM) analysis. This laboratory is currently proficient in both Proficiency Testing and PAT programs respectively.

Reservoirs Environmental, Inc. has analyzed the following samples for asbestos content as per your request. The analysis has been completed in general accordance with the appropriate methodology as stated in the attached analysis table. The results have been submitted to your office.

RES 221773-1 is the job number assigned to this study. This report is considered highly confidential and the sole property of the customer. Reservoirs Environmental, Inc. will not discuss any part of this study with personnel other than those of the client. The results described in this report only apply to the samples analyzed. This report must not be used to claim endorsement of products or analytical results by NVLAP or any agency of the U.S. Government. This report shall not be reproduced except in full, without written approval from Reservoirs Environmental, Inc. Samples will be disposed of after sixty days unless longer storage is requested. If you have any questions about this report, please feel free to call 303-964-1986.

Sincerely,



Jeanne Spencer Orr  
President

# RESERVOIRS ENVIRONMENTAL, INC.

NVLAP Lab Code 101896-0; TDH: #30-0015

**TABLE I. TEM AIR FILTER SAMPLE DATA AND ANALYTICAL RESULTS**

**RES Job Number:** RES 221773-1  
**Client:** R & R Environmental  
**Client Project Number / P.O.:** None Given  
**Client Project Description:** 3rd West Sub Rocky Mtn. Power  
**Date Samples Received:** October 3, 2011  
**Analysis Type:** TEM, AHERA  
**Turnaround:** 24 Hour  
**Date Samples Analyzed:** October 4, 2011

Client ID Number	Lab ID Number	Area Analyzed	Air Volume Sampled	Number of Asbestos Structures Detected	Analytical Sensitivity	Asbestos Concentration	Filter Loading
		(mm <sup>2</sup> )	(L)		(s/cc)	(s/cc)	(s/mm <sup>2</sup> )
3W-92811-E	EM 804177	0.0990	792	ND	0.0049	BAS	BAS
3W-92811-S	EM 804178	0.0990	792	ND	0.0049	BAS	BAS
3W-92811-N	EM 804179	0.0990	792	ND	0.0049	BAS	BAS
3W-92811-W	EM 804180	0.0990	792	ND	0.0049	BAS	BAS
3W-92911-E	EM 804181	0.0880	927	ND	0.0047	BAS	BAS
3W-92911-S	EM 804182	0.0880	923	ND	0.0047	BAS	BAS
3W-92911-N	EM 804183	NA	0	NA	---	---	---
3W-92911-W	EM 804184	0.0880	921	ND	0.0048	BAS	BAS

NA = Not Analyzed

ND = None Detected


BAS = Below Analytical Sensitivity

Average Grid Opening in mm<sup>2</sup> = 0.011

Filter Material = Mixed Cellulose Ester

Filter Diameter = 25 mm

Effective Filter Area = 385 sq mm

  
 Digitally signed by  
 Gina Vettriano  
 Date: 2011.10.04  
 11:13:29 -0600

**DATA QA**

# PACIFICORP OPERATIONS - Field Construction Representative Daily Log

PROJECT NAME: Third West Sub - Rebuild

DATE: Monday, September 26, 2011

PO & Work Order NO.: 3000078050 / 10035803

MAIN CONTRACTOR: RMP

Crew Start Time: 7:00

Crew Stop Time: 16:15

Tot Hrs mns: 9:15

FCR Start Time: 6:50

FCR Stop Time: 16:20

Tot Hrs mns: 9:30

Use military time format 00:00

WEATHER CONDITIONS: Partly Cloudy - 76 degrees

**DESCRIPTION: (work performed, general comments, instructions to contractor, # of crew members onsite.)**

R&R set up monitors. Eagle Environmental personnel provided direction regarding proper ingress and egress, to and from, the exclusion zone. Newman hauled three loads (truck and pup) of yard rock from the "clean" zone, received visqueen for enclosing the material to be removed from the exclusion zone, and brought a power washer on-site for washing down trucks and toilets. The circus has demobed from the area, fence in parking lot has been removed and ESA is sweeping and cleaning up the parking lot. Newman was anticipating excavating material from the exclusion area today, but they don't have all of the materials they need for sealing up the trucks when they leave the site, so we're now looking at starting the excavation on Tuesday, 9/27. Newman has asked R&R to go ahead and sample the exclusion zone excavation material on Tuesday, as Bland cannot take any material more than 1%.

**IF WORKING IN ENERGIZED SUBSTATION:**

Dispatcher login, name and time: Ken Barto 0650

Dispatcher logout, name and time: Kim Batt 1620

**DISCREPANCIES:**

**IMMEDIATE CORRECTIVE ACTION TAKEN:**


**DELAYS OR LOST TIME ENCOUNTERED:**

--

**EQUIPMENT (working, delivered, idle):**

Pickup, portable toilet, forklift, 2 dumpsters, office trailer, conex, exclusion zone conex (2), water wagon, portable wash-down structure, trackhoe, mini-ex, bobcat, power washer, water truck

**OSHA Recordable Safety Incidents:**

**Reported by:**

**Time:**




Russ Johnson

Field Construction Representative

# PACIFICORP OPERATIONS - Field Construction Representative Daily Log

PROJECT NAME: Third West Sub - Rebuild

DATE : Tuesday, September 27, 2011

PO & Work Order NO. : 3000078050 / 10035803

MAIN CONTRACTOR : Cache Valley Electric

Crew Start Time: 6:50

Crew Stop Time: 16:30

Tot Hrs mns: 9:40

FCR Start Time: 6:50

FCR Stop Time: 17:50

Tot Hrs mns: 11:00

Use military time format 00:00

WEATHER CONDITIONS:

Sunny - 80 degrees

**DESCRIPTION: (work performed, general comments, instructions to contractor, # of crew members onsite.)**

R&R set up four monitors. Newman drained the conex water supply trailer and refilled with fresh water. Newman picked up some glue and tape for wrapping up the loads of excavated material. Eagle was on site for about two hours and provided instruction to the Newman crew regarding the procedure for wrapping the excavated material. The first load (truck #1102/pup #1194) of excavated material from the exclusion zone was loaded, starting at 11:00 and left the site at 12:05. Loading, wrapping, and washdown took 65 minutes. This did not include the time to place the visqueen in the beds of the truck and pup. A second truck (#1125) arrived at 12:10 and left the site at 2:20, after waiting for notification that the material could be delivered to Grassey Mtn. The second truck will return in the morning with a pup trailer, get loaded and take the second load to the landfill. Newman completed the day by scraping up gravel from the "clean" yard. R&R returned to the site and collected the air monitors. Contractors: CVE = 1, Newman = 3, R&R=1, Eagle = 2, Truck Drivers = 2.

**IF WORKING IN ENERGIZED SUBSTATION:**

Dispatcher login, name and time:	Ken Barto 0730 (got busy and didn't call for a while)
Dispatcher logout, name and time:	Manny LuHaun 1750

**DISCREPANCIES:**

**IMMEDIATE CORRECTIVE ACTION TAKEN:**

No TOC is identified for the cap banks and associated get-a-ways.	I discussed this with Brent Wiggins and will send an email to confirm our discussion.

**DELAYS OR LOST TIME ENCOUNTERED:**

The disposal site, I assume to be Grassy Mountain, held up the dumping of the first truck today until they could evaluate what the material was that was being delivered. That is why the second truck didn't make a run to the landfill and will wait until tomorrow morning to make the run. I will find out more specifics on Wednesday to determine if this is a one-time delay, or if this will be problematic going forward. Additionally, SLC is refusing to allow Newman to fill their water trucks from a local hydrant and is requiring them to go to the Water Dept on 1500 South West Temple to pick up water. It appears this is a new city ordinance and not anything specific to Newman.

**EQUIPMENT (working, delivered, idle):**

Pickup, portable toilet, forklift, 2 dumpsters, office trailer, conex, exclusion zone conex (2), water wagon, portable wash-down structure, trackhoe, mini-ex, bobcat, power washer, water truck

**OSHA Recordable Safety Incidents:**

**Reported by:**

**Time:**




Russ Johnson

Field Construction Representative

# PACIFICORP OPERATIONS - Field Construction Representative Daily Log

PROJECT NAME: Third West Sub - Rebuild

DATE: Wednesday, September 28, 2011

PO & Work Order NO. : 3000078050 / 10035803

MAIN CONTRACTOR : Cache Valley Electric

Crew Start Time: 6:50

Crew Stop Time: 16:30

Tot Hrs mns: 9:40

FCR Start Time: 6:50

FCR Stop Time: 17:00

Tot Hrs mns: 10:10

Use military time format 00:00

WEATHER CONDITIONS:

Sunny - 85 degrees

DESCRIPTION: (work performed, general comments, instructions to contractor, # of crew members onsite.)

R&R set up four monitors. Newman has not been able to do any additional excavation in the exclusion zone because their trucks are tied up at Grassy Mountain until Grassy completes an analysis of the material which will tell them where they can dump the material. Newman shot some grades to allow them to begin some initial grading in the east half of Zone 2. We didn't see any trucks back from Grassy Mtn today so will hopefully be moving gravel on Thursday. Wilding took a sample of the backfill from the 2004-2005 project and will provide Newman with a proctor so this material can be used for backfill in Zones 1, 2, and 3. Contractors: CVE = 1, Newman = 3, R&R=1, Wilding = 1.

IF WORKING IN ENERGIZED SUBSTATION:

Dispatcher login, name and time: Ken Barto 0650

Dispatcher logout, name and time: Al Swinski 1700

DISCREPANCIES:

IMMEDIATE CORRECTIVE ACTION TAKEN:

We identified that the base of the east fence line is approximately .5' higher than shown on the grading plan. I spoke with Brent Wiggins regarding this issue and he indicates that we just need to work with the elevation as it exists and will keep the road grade as drawn up. This will mean that we will be dropping 2.5' from the fence line to the edge of the new road. The challenge with this will be trying to place yard rock on the slope without it sloughing down onto the roadway

None required, we'll just work with the higher elevation.

DELAYS OR LOST TIME ENCOUNTERED:

The Newman trucks we loaded out yesterday were not able to dump at the Grassy Mtn location and had to return to the Newman yard. They went back out this morning and we have not yet been notified that they were able to dump today.

EQUIPMENT (working, delivered, idle):

Pickup, portable toilet, forklift, 2 dumpsters, office trailer, conex, exclusion zone conex (2), water wagon, portable wash-down structure, trackhoe, mini-ex, bobcat, power washer, water truck

OSHA Recordable Safety Incidents:

Reported by:

Time:



**ROCKY MOUNTAIN  
POWER**

A DIVISION OF PACIFICORP

Russ Johnson

Field Construction Representative

# PACIFICORP OPERATIONS - Field Construction Representative Daily Log

**PROJECT NAME:** Third West Sub - Rebuild

**DATE :** Thursday, September 29, 2011

**PO & Work Order NO. :** 3000078050 / 10035803

**MAIN CONTRACTOR :** Cache Valley Electric

**Crew Start Time:** 7:00

**Crew Stop Time:** 16:30

**Tot Hrs mns:** 9:30

**FCR Start Time:** 7:00

**FCR Stop Time:** 17:30

**Tot Hrs mns:** 10:30

**Use military time format 00:00**

**WEATHER CONDITIONS:**

Sunny - 85 degrees

**DESCRIPTION: (work performed, general comments, instructions to contractor, # of crew members onsite.)**

R&R set up four monitors. Newman cleanup up the excavation in the exclusion area, as we won't be removing anymore material until Monday. The trackhoe was washed down and moved into Zone 2 to load out yardrock. Hauled out four loads of gravel (truck/pup). Started cutting the SE corner and east face of the yard down to grade and identified an issue with the elevation of the roadway in that area relative to the elevation of the retaining wall along the south side of the east yard, with the retaining wall being approx 2'-2" lower than the finish road elevation. Mr Schmidt returned to the site around 3:30 and expressed concerns about the environmental and personal liability that his company has acquired as a result of CVE/Newman traveling equipment across their property. He has given us verbal permission to move ahead with our hauling plans for Monday, Tuesday, and Wednesday of next week. He indicates that he is having a legal document drawn up that will indemnify his company from any damages, both environmental and personal, that may occur as a result of the contractor driving on their property. In an effort to encourage him to allow us to move ahead on Monday with our hauling plans, i committed to making sure that his paperwork was forwarded to the appropriate individuals/entities in a timely manner. Contractors: CVE = 1, Newman = 4, R&R=1.

**IF WORKING IN ENERGIZED SUBSTATION:**

**Dispatcher login, name and time:** Ken Barto 0717

**Dispatcher logout, name and time:** Barry Nielson 1715

**DISCREPANCIES:**

**IMMEDIATE CORRECTIVE ACTION TAKEN:**

The retaining wall along the SE portion of the yard is 2.14' lower than the proposed elevation for the new roadway running east and west along that section of the yard

Contacted Brent Wiggins and gave him the elevations for the south retaining walls. Requested he visit the site

A PEC Development representative stopped by. He indicates that they are planning work on a new parking structure in the area where our office trailer is parked, beginning in early Jan

Notified Mike Shepherd and Scott Collard.

**DELAYS OR LOST TIME ENCOUNTERED:**

**EQUIPMENT (working, delivered, idle):**

Pickup, portable toilet, forklift, 2 dumpsters, office trailer, conex, exclusion zone conex (2), water wagon, portable wash-down structure, trackhoe, mini-ex, bobcat, power washer, water truck

**OSHA Recordable Safety Incidents:**

**Reported by:**

**Time:**



Russ Johnson

**Field Construction Representative**

# PACIFICORP OPERATIONS - Field Construction Representative Daily Log

PROJECT NAME: Third West Sub - Rebuild

DATE: Friday, September 30, 2011

PO & Work Order NO.: 3000078050 / 10035803

MAIN CONTRACTOR: Cache Valley Electric

Crew Start Time: 6:50

Crew Stop Time: 14:30

Tot Hrs mns: 7:40

FCR Start Time: 6:50

FCR Stop Time: 15:30

Tot Hrs mns: 8:40

Use military time format 00:00

WEATHER CONDITIONS: Sunny - 90 degrees

## DESCRIPTION: (work performed, general comments, instructions to contractor, # of crew members onsite.)

R&R set up four monitors. Newman is continuing the grading of the east side of the yard and stockpiling of the material in the center of the substation. They have graded from the SE corner of the yard to the south side of the east gate. Brent Wiggins came to the site to discuss the elevation issues we encountered yesterday. It was determined that we will need to modify the grading plan to adjust for the difference between the elevation of the south retaining wall and the top of roadway as it runs east and west along the south face of the substation. Brent will work on modifying the drawing to show the new control points we will be working with in order to accomplish this. There will need to be some "field to determine" action on site to make this work. Newman indicates that they have four truck/pups lined up for Monday and Tuesday, and Wednesday if necessary, to haul waste material to Grassy Mountain. The trucks will be provided by Grassy Mountain. Our hope is that by Friday of next week we will have the backfill in place and be ready for the concrete crew to come in on Monday, October 10. Contractors: CVE = 1, Newman = 3, R&R=1.

## IF WORKING IN ENERGIZED SUBSTATION:

Dispatcher login, name and time: Ken Barto 0710

Dispatcher logout, name and time: Jim Bowman 1520

## DISCREPANCIES:

## IMMEDIATE CORRECTIVE ACTION TAKEN:


## DELAYS OR LOST TIME ENCOUNTERED:

--

## EQUIPMENT (working, delivered, idle):

Pickup, portable toilet, forklift, 2 dumpsters, office trailer, conex, exclusion zone conex (2), water wagon, portable wash-down structure, trackhoe, mini-ex, bobcat, power washer, water truck

## OSHA Recordable Safety Incidents:

Reported by:

Time:




Russ Johnson

Field Construction Representative





## 3<sup>rd</sup> West Substation Site Project Safety Audit

Project: 3<sup>rd</sup> West Sub Station

Date: 9/26/11

Location: 3<sup>rd</sup> West, 1<sup>st</sup> South, SLC

Job Number: \_\_\_\_\_

Survey Conducted By: Iustin Kargis

Title: \_\_\_\_\_

Standard	Title	In Compliance	Out of Compliance	N/A	Corrective Action Taken and Date
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1926.59	Hazard Communication Program, List of Chemicals, Training, MSDSs.			x	
1926.500 (b) & (d) (old standard)	Guardrails on open sided floors, floor holes and runways.			x	
1926.404 (b)	Ground fault circuit interrupters or an assured equipment grounding conductor program in use.			x	
1926.451 (b)	The employer shall instruct each employee in the recognition and avoidance of unsafe conditions.			x	
1926.451 (d)	Tubular welded scaffolds shall be properly braced so that they are plumb, square and rigid; legs on plumb, adjustable, mud sills, etc. to support the maximum load; guardrails and toeboards shall be installed.			x	
1926.100 (a)	Head protection, where there is a possible danger of head injury.	x			

		In Compliance	Out of Compliance	N/A	
<i>Standard</i>	<i>Title</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Corrective Action Taken and Date</i>
1926.652 (a) (1)	Excavation protective systems; examination by competent person when less than 5 feet in depth.			x	
1926.20 (b) (2)	Employer responsibility to initiate and maintain safety and health programs.			x	
1926.20 (b) (1)	Employer responsibility to provide for frequent and regular inspections by designated competent persons.			x	
1926.451 (e)	Manually propelled scaffolds shall have tight planking for the full width, platforms secured, ladder or stairway provided, suitable footing, stand plumbs, wheels locked, guardrails and toeboards.			x	
1926.1052 (c) (1)	Stair rail and handrail along each unprotected edge.			x	
1926.25 (a)	Debris, scrap lumber with protruding nails, not cleared for work areas, stairs and around structures.			x	
1926.50	First aid shall be available in the absence of an infirmary, or other that is reasonably accessible; first aid supplies shall be accessible and telephone numbers posted.			x	
1926.451 (a) (13)	Scaffolding safe access not provided by ladder or equivalent.			x	
1926.651 (k) (1)	Excavations, protective systems, inspected daily by a competent person and as needed.			x	
1926.403 (b) (2)	Employer shall ensure electrical equipment is free from recognized hazards, is suitable, used in accordance with the listing, labeling or certification.			x	

Standard	Title	In Compliance	Out of Compliance	N/A	Corrective Action Taken and Date
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1926.451 (a) (4)	Scaffolding shall have guardrails and toeboards when more than 10 feet high and when less than 45 inches of work space.			x	
1926.405 (g) (2)	Flexible cords shall be used without splice or tap; strain relief shall be provided.			x	
1926.405 (b)	Electrical boxes, fittings shall have covers, faceplates or canopy and holes shall be smooth where cords pass through; and unused openings in cabinets/boxes shall be closed.	x			
1926.701 (b)	Reinforcing steel onto which employees could fall shall be guarded.			x	
1926.1053 (b) (1)	Portable ladder side rails extend at least 3 feet or be secured at top.			x	
1926.651 (j) (2)	Excavations shall have materials or equipment placed at least 2 feet from the edge.			x	
1926.651 (c) (2)	Excavations shall have a safe means of egress such as ladders, ramps, etc.			x	
1926.150 (c) (1)	Portable fire fighting equipment shall be provided and extinguishers shall be inspected periodically.			x	
1926.102 (a) (1)	Eye and face protection shall be provided.	x			
1926.300 (b) (2)	Guards for power tools shall be used and moving parts of equipment shall be guarded.			x	
1926.350 (a) (9)	Oxygen cylinders in storage shall be separated from fuel gas cylinders by at least 20 feet or a ½ fire resistance barrier.			x	

		In Compliance	Out of Compliance	N/A	
<i>Standard</i>	<i>Title</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Corrective Action Taken and Date</i>
1926.405 (a) (2) (ii) (e) & (f)	Temporary lights shall be protected from breakage, not suspended by their cords and extension cord.			X	
1926.405 (a) (2) (ii) (j)	Extension cords used with portable electric tools shall be of three wire type and designed for hard or extra hard usage.			x	
1926.105 (a)	Workplaces more than 25 feet above the ground or water shall have safety nets when ladder, safety line/belts, temporary floors, scaffolds, catch platform are not practical.			x	
1926.1051 (a)	Stairway or ladder shall be provided at all access points where there is a break in elevation of 19 inches or more.			x	
1926.451 (a) (2)	Scaffolding footing or anchorage shall be sound, rigid and capable of carrying the maximum intended load.			x	
1926.500 (c) (1) (old standard)	Wall opening shall be guarded.			x	
1926.404 (f) (7)	Electrical equipment connected by cord and plug shall be grounded except if there is an isolating transformer of the tool is double insulated.			x	
1926.556 (b) (2)	When working from an aerial lift, a full body harness and lanyard attached to the boom or basket.			x	
1926.501 (b) (1) (new standard)	Guardrails, safety nets or personal fall arrest system shall be used at 6 feet or more.			x	

		In Compliance	Out of Compliance	N/A	
<i>Standard</i>	<i>Title</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Corrective Action Taken and Date</i>
1926.451 (a) (14)	Scaffold planking shall extend over their end support not less than 6 inches and not more than 12 inches.			x	
1926.602 (a) (9)	Bi-directional earth moving equipment shall have audible alarms.	x			
1926.451 (a) (3)	Scaffolding shall be erected, moved, dismantled or altered under the supervision of a competent person.			x	
1926.550 (b) (2)	Cranes, crawler, truck or locomotive, shall meet the design, testing, maintenance, and operation per ANSI B30.5_1968. The most recent certification shall be on file until a new one is prepared.			x	

**Comments:**

Met with Kayli Roller to discuss water control/clean up items.

Robert from Eagle on site to instruct on worker decontamination procedures.

Newman continued to scrape, pile, and load yard rock for removal from site.

Street sweeper cleaned circus leftovers in adjacent parking lot throughout the day.

Conducted exclusion zone sampling in anticipation of work to be done there. However, no work was performed in this zone today.

# 3<sup>RD</sup> WEST SUBSTATION REMEDIATION PROJECT

## HEALTH SAFETY MANAGER (HSM)

### DAILY CHECKLIST

DATE: 9/26/11

#### General

- ☒ Work area Health and Safety Inspection
- ☒ Review and if necessary update Activity Hazard Analyses (AHA) based on planned site activities for the day
- NA Safety Planning or "Tailgate" mandatory meeting for all employees and contractors prior to commencement of any site work. Instruction, review hazards, health & safety issues and any modifications to the CSHASP
- NA Site hazard and safety instruction for all first time employees, contractors or visitors
  - Complete Employee Meeting Record Form B (where applicable)
  - na Document required Respirator Training completion with Form H
- NA Complete all CSHASP Forms (for applicable activities planned for that day)
  - na Illness/Injury Report Form A
  - na Site-Specific Training Record Form C
  - na Hot Work Permit Form D
  - na Trench/Evacuation Permit Form E
  - na Combined Space Entry Permit Form F
- ☒ Secure the site at the end of the workday

#### Sampling

- NA Soil Confirmation sampling for any newly excavated areas
- ☒ Stationary Air Monitoring during contaminated soil removal around the perimeter of the exclusions zone
- NA Personal Breathing Zone Monitoring on personnel conducting contaminated dust and soil removal
- NA Digitally photograph each sample location and at any place field sampling personnel determined necessary
  - ☒ Electronically file photo files into the on-site database
  - ☒ Complete Field Documentation
    - ☒ Field Sample Data Sheets (FSDS)
    - ☒ Logbook
    - On-site computer database
  - ☒ Label each sample media with a unique number
  - ☒ Seal sample(s) in zip lock plastic bags
  - ☒ Complete and include Chain of Custody (COC) Form required for shipping of samples to appropriate laboratory
  - ☒ Package samples for transport IAW SOP 2-1, Packaging and Shipping of Environmental Samples
- NA Review and disseminate sample results as received from the laboratories to Project Manager and other appropriate managers and employees
- NA Electronically file sample reports into on-site database



## 3<sup>rd</sup> West Substation Site Project Safety Audit

Project: 3<sup>rd</sup> West Sub Station

Date: 9/27/11

Location: 3<sup>rd</sup> West, 1<sup>st</sup> South, SLC

Job Number: \_\_\_\_\_

Survey Conducted By: Justin Kargis

Title: \_\_\_\_\_

Standard	Title	In Compliance	Out of Compliance	N/A	Corrective Action Taken and Date
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1926.59	Hazard Communication Program, List of Chemicals, Training, MSDSs.			x	
1926.500 (b) & (d) (old standard)	Guardrails on open sided floors, floor holes and runways.			x	
1926.404 (b)	Ground fault circuit interrupters or an assured equipment grounding conductor program in use.			x	
1926.451 (b)	The employer shall instruct each employee in the recognition and avoidance of unsafe conditions.			x	
1926.451 (d)	Tubular welded scaffolds shall be properly braced so that they are plumb, square and rigid; legs on plumb, adjustable, mud sills, etc. to support the maximum load; guardrails and toeboards shall be installed.			x	
1926.100 (a)	Head protection, where there is a possible danger of head injury.	x			

		In Compliance	Out of Compliance	N/A	
<i>Standard</i>	<i>Title</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Corrective Action Taken and Date</i>
1926.652 (a) (1)	Excavation protective systems; examination by competent person when less than 5 feet in depth.			x	
1926.20 (b) (2)	Employer responsibility to initiate and maintain safety and health programs.			x	
1926.20 (b) (1)	Employer responsibility to provide for frequent and regular inspections by designated competent persons.			x	
1926.451 (e)	Manually propelled scaffolds shall have tight planking for the full width, platforms secured, ladder or stairway provided, suitable footing, stand plumbs, wheels locked, guardrails and toeboards.			x	
1926.1052 (c) (1)	Stair rail and handrail along each unprotected edge.			x	
1926.25 (a)	Debris, scrap lumber with protruding nails, not cleared for work areas, stairs and around structures.			x	
1926.50	First aid shall be available in the absence of an infirmary, or other that is reasonably accessible; first aid supplies shall be accessible and telephone numbers posted.			x	
1926.451 (a) (13)	Scaffolding safe access not provided by ladder or equivalent.			x	
1926.651 (k) (1)	Excavations, protective systems, inspected daily by a competent person and as needed.			x	
1926.403 (b) (2)	Employer shall ensure electrical equipment is free from recognized hazards, is suitable, used in accordance with the listing, labeling or certification.			x	



<i>Standard</i>	<i>Title</i>	In Compliance	Out of Compliance	N/A	<i>Corrective Action Taken and Date</i>
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1926.451 (a) (4)	Scaffolding shall have guardrails and toeboards when more than 10 feet high and when less than 45 inches of work space.			x	
1926.405 (g) (2)	Flexible cords shall be used without splice or tap; strain relief shall be provided.			x	
1926.405 (b)	Electrical boxes, fittings shall have covers, faceplates or canopy and holes shall be smooth where cords pass through; and unused openings in cabinets/boxes shall be closed.	x			
1926.701 (b)	Reinforcing steel onto which employees could fall shall be guarded.			x	
1926.1053 (b) (1)	Portable ladder side rails extend at least 3 feet or be secured at top.			x	
1926.651 (j) (2)	Excavations shall have materials or equipment placed at least 2 feet from the edge.			x	
1926.651 (c) (2)	Excavations shall have a safe means of egress such as ladders, ramps, etc.			x	
1926.150 (c) (1)	Portable fire fighting equipment shall be provided and extinguishers shall be inspected periodically.			x	
1926.102 (a) (1)	Eye and face protection shall be provided.	x			
1926.300 (b) (2)	Guards for power tools shall be used and moving parts of equipment shall be guarded.			x	
1926.350 (a) (9)	Oxygen cylinders in storage shall be separated from fuel gas cylinders by at least 20 feet or a 1/2 fire resistance barrier.			x	

		In Compliance	Out of Compliance	N/A	
<i>Standard</i>	<i>Title</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Corrective Action Taken and Date</i>
1926.405 (a) (2) (ii) (e) & (f)	Temporary lights shall be protected from breakage, not suspended by their cords and extension cord.			X	
1926.405 (a) (2) (ii) (j)	Extension cords used with portable electric tools shall be of three wire type and designed for hard or extra hard usage.			x	
1926.105 (a)	Workplaces more than 25 feet above the ground or water shall have safety nets when ladder, safety line/belts, temporary floors, scaffolds, catch platform are not practical.			x	
1926.1051 (a)	Stairway or ladder shall be provided at all access points where there is a break in elevation of 19 inches or more.			x	
1926.451 (a) (2)	Scaffolding footing or anchorage shall be sound, rigid and capable of carrying the maximum intended load.			x	
1926.500 (c) (1) (old standard)	Wall opening shall be guarded.			x	
1926.404 (f) (7)	Electrical equipment connected by cord and plug shall be grounded except if there is an isolating transformer of the tool is double insulated.			x	
1926.556 (b) (2)	When working from an aerial lift, a full body harness and lanyard attached to the boom or basket.			x	
1926.501 (b) (1) (new standard)	Guardrails, safety nets or personal fall arrest system shall be used at 6 feet or more.			x	

		In Compliance	Out of Compliance	N/A	
Standard	Title	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Corrective Action Taken and Date
1926.451 (a) (14)	Scaffold planking shall extend over their end support not less than 6 inches and not more than 12 inches.			x	
1926.602 (a) (9)	Bi-directional earth moving equipment shall have audible alarms.	x			
1926.451 (a) (3)	Scaffolding shall be erected, moved, dismantled or altered under the supervision of a competent person.			x	
1926.550 (b) (2)	Cranes, crawler, truck or locomotive, shall meet the design, testing, maintenance, and operation per ANSI B30.5_1968. The most recent certification shall be on file until a new one is prepared.			x	

Comments:

-Bi-Weekly meeting at NTO items discussed include: use safety checklist to help keep track of trucks as they leave site, Eagle to keep 10-day notification for asbestos removal on hold.

-Newman began excavating in exclusion zone at approximately 11:00am. Loaded truck #1102 with pup #1194 which left the yard at approximately 12:03 after being pressure washed.

-Truck #1125 arrived at approximately 12:10 was filled, wrapped, and washed. This truck left the site at approximately 2:20 pm.

-Richard Benson from Artistic Printing next door to the site approached Justin Kargis and Neil Love with questions about work activities on the site.

-Communications between Newman and potential dump sites pertaining to contamination tolerances and dumping operations continued throughout the day.

Newman observed exclusion zone practices by watering excavations and equipment, wearing personal protective equipment, and proper decontamination.

## 3<sup>RD</sup> WEST SUBSTATION REMEDIATION PROJECT

# HEALTH SAFETY MANAGER (HSM)

### DAILY CHECKLIST

DATE: 9/27/11

#### General

- ☒ Work area Health and Safety Inspection
- ☒ Review and if necessary update Activity Hazard Analyses (AHA) based on planned site activities for the day
- ☒ Safety Planning or "Tailgate" mandatory meeting for all employees and contractors prior to commencement of any site work. Instruction, review hazards, health & safety issues and any modifications to the CSHASP
- NA Site hazard and safety instruction for all first time employees, contractors or visitors
- Complete Employee Meeting Record Form B (where applicable)
- NA Document required Respirator Training completion with Form H
- ☒ Record times and numbers of dump trucks and trailers as they leave the site with contaminated material.
- Confirm return of waste material manifest documents for each load with site manager.
- NA Complete all CSHASP Forms (for applicable activities planned for that day)
  - NA Illness/Injury Report Form A
  - NA Site-Specific Training Record Form C
  - NA Hot Work Permit Form D
  - NA Trench/Evacuation Permit Form E
  - NA Combined Space Entry Permit Form F
  - ☒ Secure the site at the end of the workday

#### Sampling

- NA Soil Confirmation sampling for any newly excavated areas
- ☒ Stationary Air Monitoring during contaminated soil removal around the perimeter of the exclusions zone
- NA Personal Breathing Zone Monitoring on personnel conducting contaminated dust and soil removal
- NA Digitally photograph each sample location and at any place field sampling personnel determined necessary
- NA Electronically file photo files into the on-site database
- NA Complete Field Documentation
- ☒ Field Sample Data Sheets (FSDS)
- ☒ Logbook
- NA On-site computer database
- ☒ Label each sample media with a unique number
- ☒ Seal sample(s) in zip lock plastic bags
- NA Complete and include Chain of Custody (COC) Form required for shipping of samples to appropriate laboratory
- NA Package samples for transport IAW SOP 2-1, Packaging and Shipping of Environmental Samples



## 3<sup>rd</sup> West Substation Site Project Safety Audit

Project: 3<sup>rd</sup> West Sub Station

Date: 9/28/11

Location: 3<sup>rd</sup> West, 1<sup>st</sup> South, SLC

Job Number: \_\_\_\_\_

Survey Conducted By: Justin Kargis

Title: \_\_\_\_\_

Standard	Title	In Compliance	Out of Compliance	N/A	Corrective Action Taken and Date
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1926.59	Hazard Communication Program, List of Chemicals, Training, MSDSs.			x	
1926.500 (b) & (d) (old standard)	Guardrails on open sided floors, floor holes and runways.			x	
1926.404 (b)	Ground fault circuit interrupters or an assured equipment grounding conductor program in use.			x	
1926.451 (b)	The employer shall instruct each employee in the recognition and avoidance of unsafe conditions.			x	
1926.451 (d)	Tubular welded scaffolds shall be properly braced so that they are plumb, square and rigid; legs on plumb, adjustable, mud sills, etc. to support the maximum load; guardrails and toeboards shall be installed.			x	
1926.100 (a)	Head protection, where there is a possible danger of head injury.	x			

		In Compliance	Out of Compliance	N/A	
<i>Standard</i>	<i>Title</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Corrective Action Taken and Date</i>
1926.652 (a) (1)	Excavation protective systems; examination by competent person when less than 5 feet in depth.			x	
1926.20 (b) (2)	Employer responsibility to initiate and maintain safety and health programs.			x	
1926.20 (b) (1)	Employer responsibility to provide for frequent and regular inspections by designated competent persons.			x	
1926.451 (e)	Manually propelled scaffolds shall have tight planking for the full width, platforms secured, ladder or stairway provided, suitable footing, stand plumbs, wheels locked, guardrails and toeboards.			x	
1926.1052 (c) (1)	Stair rail and handrail along each unprotected edge.			x	
1926.25 (a)	Debris, scrap lumber with protruding nails, not cleared for work areas, stairs and around structures.			x	
1926.50	First aid shall be available in the absence of an infirmary, or other that is reasonably accessible; first aid supplies shall be accessible and telephone numbers posted.			x	
1926.451 (a) (13)	Scaffolding safe access not provided by ladder or equivalent.			x	
1926.651 (k) (1)	Excavations, protective systems, inspected daily by a competent person and as needed.			x	
1926.403 (b) (2)	Employer shall ensure electrical equipment is free from recognized hazards, is suitable, used in accordance with the listing, labeling or certification.			x	

Standard	Title	In Compliance	Out of Compliance	N/A	Corrective Action Taken and Date
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1926.451 (a) (4)	Scaffolding shall have guardrails and toeboards when more than 10 feet high and when less than 45 inches of work space.			x	
1926.405 (g) (2)	Flexible cords shall be used without splice or tap; strain relief shall be provided.			x	
1926.405 (b)	Electrical boxes, fittings shall have covers, faceplates or canopy and holes shall be smooth where cords pass through; and unused openings in cabinets/boxes shall be closed.	x			
1926.701 (b)	Reinforcing steel onto which employees could fall shall be guarded.			x	
1926.1053 (b) (1)	Portable ladder side rails extend at least 3 feet or be secured at top.			x	
1926.651 (j) (2)	Excavations shall have materials or equipment placed at least 2 feet from the edge.			x	
1926.651 (c) (2)	Excavations shall have a safe means of egress such as ladders, ramps, etc.			x	
1926.150 (c) (1)	Portable fire fighting equipment shall be provided and extinguishers shall be inspected periodically.			x	
1926.102 (a) (1)	Eye and face protection shall be provided.	x			
1926.300 (b) (2)	Guards for power tools shall be used and moving parts of equipment shall be guarded.			x	
1926.350 (a) (9)	Oxygen cylinders in storage shall be separated from fuel gas cylinders by at least 20 feet or a 1/2 fire resistance barrier.			x	

		In Compliance	Out of Compliance	N/A	
<i>Standard</i>	<i>Title</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Corrective Action Taken and Date</i>
1926.405 (a) (2) (ii) (e) & (f)	Temporary lights shall be protected from breakage, not suspended by their cords and extension cord.			X	
1926.405 (a) (2) (ii) (j)	Extension cords used with portable electric tools shall be of three wire type and designed for hard or extra hard usage.			x	
1926.105 (a)	Workplaces more than 25 feet above the ground or water shall have safety nets when ladder, safety line/belts, temporary floors, scaffolds, catch platform are not practical.			x	
1926.1051 (a)	Stairway or ladder shall be provided at all access points where there is a break in elevation of 19 inches or more.			x	
1926.451 (a) (2)	Scaffolding footing or anchorage shall be sound, rigid and capable of carrying the maximum intended load.			x	
1926.500 (c) (1) (old standard)	Wall opening shall be guarded.			x	
1926.404 (f) (7)	Electrical equipment connected by cord and plug shall be grounded except if there is an isolating transformer of the tool is double insulated.			x	
1926.556 (b) (2)	When working from an aerial lift, a full body harness and lanyard attached to the boom or basket.			x	
1926.501 (b) (1) (new standard)	Guardrails, safety nets or personal fall arrest system shall be used at 6 feet or more.			x	



		In Compliance	Out of Compliance	N/A	
Standard	Title	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Corrective Action Taken and Date
1926.451 (a) (14)	Scaffold planking shall extend over their end support not less than 6 inches and not more than 12 inches.	<input type="checkbox"/>	<input type="checkbox"/>	x	
1926.602 (a) (9)	Bi-directional earth moving equipment shall have audible alarms.	x	<input type="checkbox"/>	<input type="checkbox"/>	
1926.451 (a) (3)	Scaffolding shall be erected, moved, dismantled or altered under the supervision of a competent person.	<input type="checkbox"/>	<input type="checkbox"/>	x	
1926.550 (b) (2)	Cranes, crawler, truck or locomotive, shall meet the design, testing, maintenance, and operation per ANSI B30.5_1968. The most recent certification shall be on file until a new one is prepared.	<input type="checkbox"/>	<input type="checkbox"/>	x	

Comments:

-R7R took 10 soil samples in exclusion zone excavation site for new control building. Took these samples to Dixon at approximately 10:30 and asked for rush turn-around.

-Newman shot grades for zone 2 elevations.

Tom Wilding came in the afternoon to collect soil samples along the east boundary fence.

-No exclusion zone work today.

## 3<sup>RD</sup> WEST SUBSTATION REMEDIATION PROJECT

# HEALTH SAFETY MANAGER (HSM)

### DAILY CHECKLIST

DATE: 9/28/11

#### General

- ☐ Work area Health and Safety Inspection
- ☒ Review and if necessary update Activity Hazard Analyses (AHA) based on planned site activities for the day
- ☒ Safety Planning or "Tailgate" mandatory meeting for all employees and contractors prior to commencement of any site work. Instruction, review hazards, health & safety issues and any modifications to the CSHASP
- NA Site hazard and safety instruction for all first time employees, contractors or visitors
- Complete Employee Meeting Record Form B (where applicable)
- NA Document required Respirator Training completion with Form H
- ☒ Record times and numbers of dump trucks and trailers as they leave the site with contaminated material.
- NA Confirm return of waste material manifest documents for each load with site manager.
- NA Complete all CSHASP Forms (for applicable activities planned for that day)
  - NA Illness/Injury Report Form A
  - NA Site-Specific Training Record Form C
  - NA Hot Work Permit Form D
  - NA Trench/Evacuation Permit Form E
  - NA Combined Space Entry Permit Form F
- ☒ Secure the site at the end of the workday

#### Sampling

- NA Soil Confirmation sampling for any newly excavated areas
- ☒ Stationary Air Monitoring during contaminated soil removal around the perimeter of the exclusions zone
- NA Personal Breathing Zone Monitoring on personnel conducting contaminated dust and soil removal
- NA Digitally photograph each sample location and at any place field sampling personnel determined necessary
- NA Electronically file photo files into the on-site database
- NA Complete Field Documentation
- ☒ Field Sample Data Sheets (FSDS)
- ☒ Logbook
- NA On-site computer database
- ☒ Label each sample media with a unique number
- ☒ Seal sample(s) in zip lock plastic bags
- NA Complete and include Chain of Custody (COC) Form required for shipping of samples to appropriate laboratory
- NA Package samples for transport IAW SOP 2-1, Packaging and Shipping of Environmental Samples

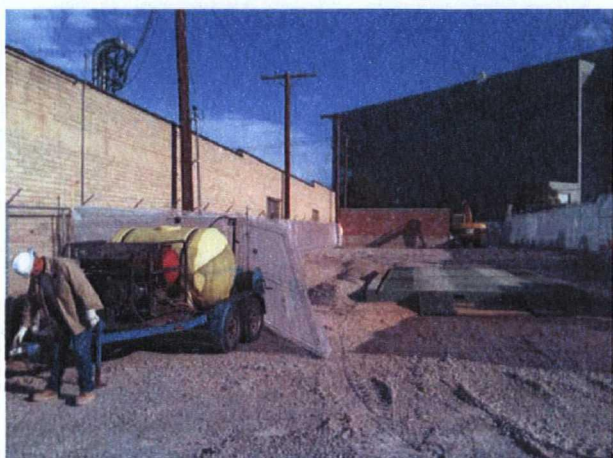


PHOTO 1



PHOTO 2

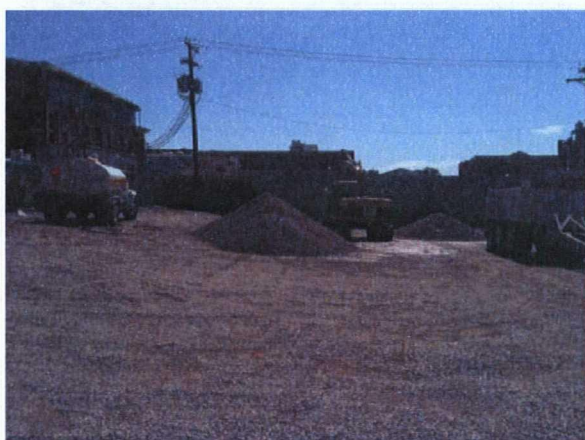


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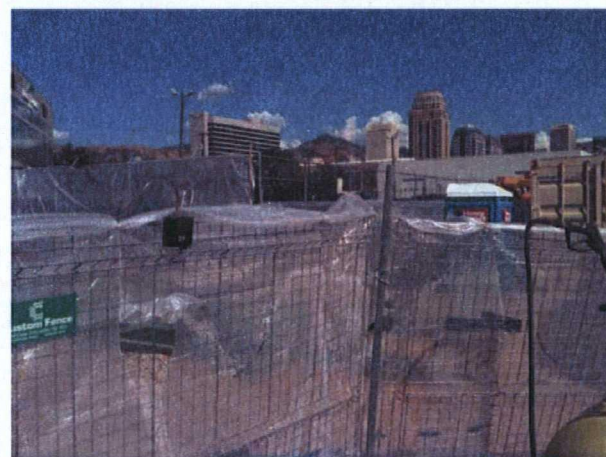


PHOTO 4

## **R & R**Environmental, Inc.

47 West 9000 South, Suite #2, Sandy, Utah 84070  
(801) 352-2380 • Fax: (801) 352-2381

PROJECT NO:

DESIGNED BY:

SCALE:

REVIEWED BY:

DCR

DRAWN BY:

JMK

DATE:

9/26/11

FILE:

## SITE PHOTOGRAPHS



**3<sup>rd</sup> West Substation**  
**"2011 Upgrade Project"**  
**Salt Lake City, Utah**



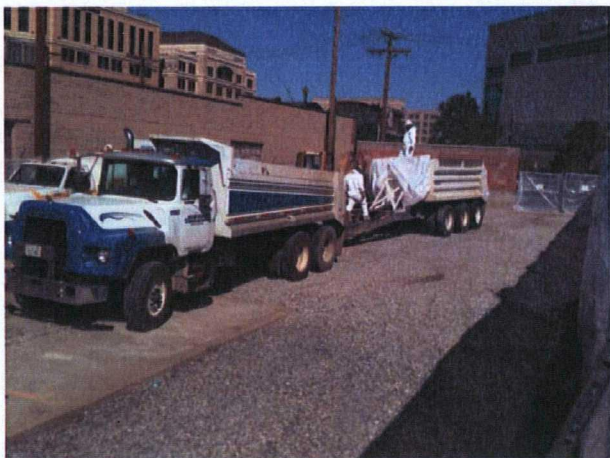


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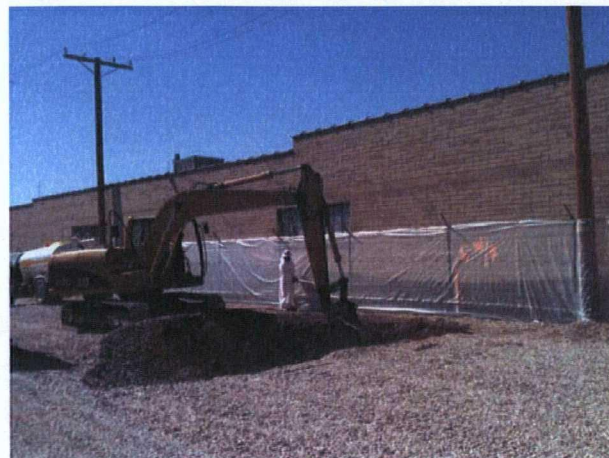


PHOTO 2



PHOTO 3

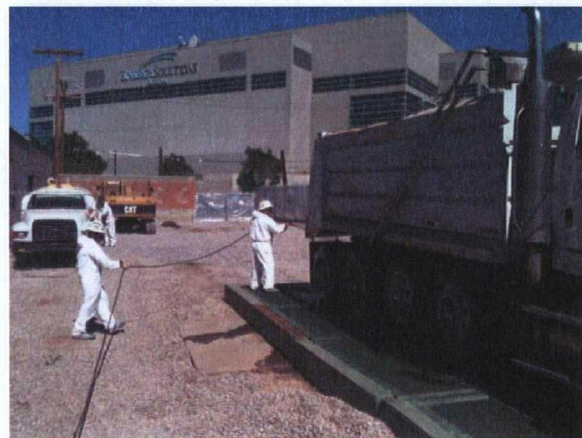


PHOTO 4

## **R & R**Environmental, Inc.

47 West 9000 South, Suite #2, Sandy, Utah 84070  
(801) 352-2380 • Fax: (801) 352-2381

PROJECT NO:

DESIGNED BY:

SCALE:

REVIEWED BY:

DCR

DRAWN BY:

JMK

DATE:

9/27/2011

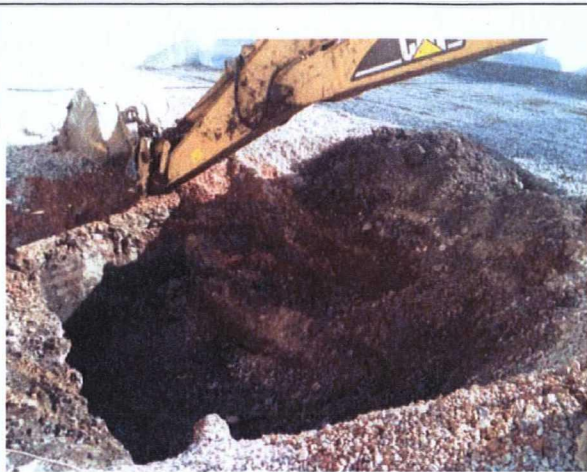
FILE:

## SITE PHOTOGRAPHS



**3<sup>rd</sup> West Substation**  
**"2011 Upgrade Project"**  
**Salt Lake City, Utah**





**PHOTO 1**



**PHOTO 2**



**PHOTO 3**



**PHOTO 4**

## **R & R**Environmental, Inc.

47 West 9000 South, Suite #2, Sandy, Utah 84070  
(801) 352-2380 • Fax: (801) 352-2381

PROJECT NO:

DESIGNED BY:

SCALE:

REVIEWED BY:

DCR

DRAWN BY:

JMK

DATE:

9/28/2011

FILE:

## **SITE PHOTOGRAPHS**



**3<sup>rd</sup> West Substation**  
**"2011 Upgrade Project"**  
**Salt Lake City, Utah**



September 29, 2011

Laboratory Code: RES  
Subcontract Number: NA  
Laboratory Report: RES 221469-1  
Project # / P.O. #: None Given  
Project Description: 3rd West Sub - Rocky Mtn. Power

David Roskelley  
R & R Environmental  
47 West 9000 South #2  
Sandy UT 84070

Dear Customer,

Reservoirs Environmental, Inc. is an analytical laboratory accredited for the analysis of Industrial Hygiene and Environmental matrices by the National Voluntary Laboratory Accreditation Program (HVLAP), Lab Code 101896-0 for Transmission Electron Microscopy (TEM) and Polarized Light Microscopy (PLM) analysis and the American Industrial Hygiene Association (AIHA), Lab ID 101533 - Accreditation Certificate #480 for Phase Contrast Microscopy (PCM) analysis. This laboratory is currently proficient in both Proficiency Testing and PAT programs respectively.

Reservoirs Environmental, Inc. has analyzed the following samples for asbestos content as per your request. The analysis has been completed in general accordance with the appropriate methodology as stated in the attached analysis table. The results have been submitted to your office.

RES 221469-1 is the job number assigned to this study. This report is considered highly confidential and the sole property of the customer. Reservoirs Environmental, Inc. will not discuss any part of this study with personnel other than those of the client. The results described in this report only apply to the samples analyzed. This report must not be used to claim endorsement of products or analytical results by NVLAP or any agency of the U.S. Government. This report shall not be reproduced except in full, without written approval from Reservoirs Environmental, Inc. Samples will be disposed of after sixty days unless longer storage is requested. If you have any questions about this report, please feel free to call 303-964-1986.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeanne Orr", is written over a horizontal line.

Jeanne Spencer Orr  
President

P: 303-964-1986  
F: 303-477-4275

5801 Logan Street, Suite 100 Denver, CO 80216

1-866-RESI-ENV  
www.reilab.com

# RESERVOIRS ENVIRONMENTAL, INC.

NVLAP Lab Code 101896-0; TDH: #30-0015

TABLE I. TEM AIR FILTER SAMPLE DATA AND ANALYTICAL RESULTS

RES Job Number: RES 221469-1  
 Client: R & R Environmental  
 Client Project Number / P.O.: None Given  
 Client Project Description: 3rd West Sub - Rocky Mtn. Power  
 Date Samples Received: September 28, 2011  
 Analysis Type: TEM, AHERA  
 Turnaround: 24 Hour  
 Date Samples Analyzed: September 28, 2011 - September 29, 2011

Client ID Number	Lab ID Number	Area Analyzed	Air Volume Sampled	Number of Asbestos Structures Detected	Analytical Sensitivity	Asbestos Concentration	Filter Loading
		(mm <sup>2</sup> )	(L)		(s/cc)	(s/cc)	(s/mm <sup>2</sup> )
3W-092311-S	EM 802147	0.0880	910	ND	0.0048	BAS	BAS
3W-092311-E	EM 802148	0.0880	910	ND	0.0048	BAS	BAS
3W-092311-N	EM 802149	0.0880	908	ND	0.0048	BAS	BAS
3W-092311-W	EM 802150	0.0880	908	ND	0.0048	BAS	BAS
3W-092611-E	EM 802151	0.0880	959	ND	0.0046	BAS	BAS
3W-092611-S	EM 802152	0.0880	952	ND	0.0046	BAS	BAS
3W-092611-N	EM 802153	0.0880	955	ND	0.0046	BAS	BAS
3W-092611-W	EM 802154	0.0880	955	ND	0.0046	BAS	BAS
3W-092611-EZS	EM 802155	0.0990	824	1	0.0047	0.0047	10.1
3W-092611-EZN	EM 802156	0.0990	834	ND	0.0047	BAS	BAS

NA = Not Analyzed  
 ND = None Detected  
 BAS = Below Analytical Sensitivity  
 Average Grid Opening in mm<sup>2</sup> = 0.011

Filter Material = Mixed Cellulose Ester  
 Filter Diameter = 25 mm  
 Effective Filter Area = 385 sq mm

Digitally  
 signed by  
 Gina  
 Vietriano  
 Date:  
 2011.09.29  
 11:03:40 -  
 06'00"

DATA QA

# RESERVOIRS ENVIRONMENTAL, INC.

NVLAP Lab Code 101898-0; TDH: #30-0015

TABLE II. SUMMARY OF ANALYTICAL DATA

RES Job Number: RES 221469-1  
 Client: R & R Environmental  
 Client Project Number / P.O.: None Given  
 Client Project Description: 3rd West Sub - Rocky Mtn. Power  
 Date Samples Received: September 28, 2011  
 Analysis Type: TEM, AHERA  
 Turnaround: 24 Hour  
 Date Samples Analyzed: September 28, 2011 - Sep

Client ID Number	Lab ID Number	Asbestos Mineral	Asbestos Structure Types*				Structures >5 Microns in Length	**Excluded Structures	Asbestos Structures for Concentration
			Fibers	Bundles	Clusters	Matrices			
3W-092311-S	EM 802147	ND	0	0	0	0	0	0	0
3W-092311-E	EM 802148	ND	0	0	0	0	0	0	0
3W-092311-N	EM 802149	ND	0	0	0	0	0	0	0
3W-092311-W	EM 802150	ND	0	0	0	0	0	0	0
3W-092611-E	EM 802151	ND	0	0	0	0	0	0	0
3W-092611-S	EM 802152	ND	0	0	0	0	0	0	0
3W-092611-N	EM 802153	ND	0	0	0	0	0	0	0
3W-092611-W	EM 802154	ND	0	0	0	0	0	0	0
3W-092611-EZS	EM 802155	Chrysotile	0	0	0	1	0	0	1
3W-092611-EZN	EM 802156	ND	0	0	0	0	0	0	0

\*See Analytical Procedure for definitions

\*\*C = Excluded from total due to lack of confirmation

\*\*L = Excluded from total for length less than 0.5 micron (AHERA only)

\*\*A = Excluded from total due to incorrect aspect ratio

ND = None Detected



Due Date: 9-29  
Due Time:

**REI LAB** **Reservoirs Environmental, Inc.**  
5801 Logan St. Denver, CO 80216 • Ph: 303 864-1988 • Fax 303-477-4275 • Toll Free: 866 REI-ENV  
Pager: 303-608-2088

RES 221469

**INVOICE TO: (IF DIFFERENT)**

**CONTACT INFORMATION:**

Company: <u>24R Environmental</u>	Company:	Contact: <u>Dave Rockelley</u>	Contact:
Address: <u>47 W. 9000 S</u>	Address:	Phone:	Phone:
<u>Sandy, UT. 84070</u>		Fax:	Fax:
		Cell/pager: <u>801 541-1035</u>	Cell/pager:
Project Number and/or P.O. #:		Print Date Delivery Email Address:	
Project Description/Location: <u>3rd West Sub - Rocky Mtn. Power</u>		<u>dave@rrenviro.com</u>	

ASBESTOS LABORATORY HOURS: Weekdays: 7am - 5pm		REQUESTED ANALYSIS										VALID MATRIX CODES		LAB NOTES:			
PLM / PCM / TEM <u>   </u> RUSH (Same Day) <u>X</u> PRIORITY (Next Day) <u>   </u> STANDARD (Rush PCM = 2hr, TEM = 8hr.)												Air = A	Bulk = B				
CHEMISTRY LABORATORY HOURS: Weekdays: 8am - 5pm												Dust = D	Paint = P				
Metal(s) / Dust <u>   </u> RUSH <u>   </u> 24 hr. <u>   </u> 3-5 Day												Soil = S	Wipe = W				
RCRA 8 / Metals & Welding <u>   </u> RUSH <u>   </u> 5 day <u>   </u> 10 day												Swab = SW	F = Food				
Fume Scan / TCLP <u>   </u> RUSH <u>   </u> 5 day <u>   </u> 10 day												Drinking Water = DW	Waste Water = WW				
Organics <u>   </u> 24 hr. <u>   </u> 3 day <u>   </u> 5 Day												O = Other					
MICROBIOLOGY LABORATORY HOURS: Weekdays: 9am - 9pm												**ASTM 61792 approved wipe media only**					
E.coli O157:H7, Coliforms, S.aureus <u>   </u> 24 hr. <u>   </u> 2 Day <u>   </u> 3-5 Day												Sample Volume (L) / Area	Matrix Code	# Containers	Date Collected mm/dd/yy	Time Collected hh:mm ap	EM Number (Laboratory Use Only)
Salmonella, Listeria, E.coli, APC, Y & M <u>   </u> 48 Hr. <u>   </u> 3-5 Day																	
Mold <u>   </u> RUSH <u>   </u> 24 Hr <u>   </u> 48 Hr <u>   </u> 3 Day <u>   </u> 5 Day																	
**Turnaround times establish a laboratory priority, subject to laboratory volume and are not guaranteed. Additional fees apply for afterhours, weekends and holidays.**																	
Special Instructions:																	
Client sample ID number (Sample ID's must be unique)																	
1	3W-092311-S	X											910	A	9/23/11		802147
2	3W-092311-E												910				48
3	3W-092311-N												908				49
4	3W-092311-W												908				50
5	3W-092611-E												959		9/26/11		51
6	3W-092611-S												952				52
7	3W-092611-N (Exclusion Zone East)												955				53
8	3W-092611-W												955				54
9	3W-092611-EZS (Exclusion Zone South)												824				55
10	3W-092611-EZN (Exclusion Zone North)												834				56

Number of samples received: 10 (Additional samples shall be listed on attached long form.)

NOTE: REI will analyze incoming samples based upon information received and will not be responsible for errors or omissions in calculations resulting from the inaccuracy of original data. By signing client/company representative agrees that submission of the following samples for requested analysis as indicated on this Chain of Custody shall constitute an analytical services agreement with payment terms of NET 30 days, failure to comply with payment terms may result in a 1.5% monthly interest surcharge.

Relinquished By: <u>Justin Kyrie - Fed-Ex</u>		Date/Time: <u>9/27/11</u>		Sample Condition: On Ice Sealed Intact	
Laboratory Use Only		Carrier: <u>FedEx</u>		Temp. (F°) Yes / No Yes / No Ym / No	
Received By: <u>Dave</u>		Date/Time: <u>9-28-11 8:50</u>			
Results:	Contact <u>Dave</u> Phone Email Fax	Date <u>9/29/11</u> Time <u>9:00am</u> Initials <u>DF</u>	Contact	Phone Email Fax	Date Time Initials
	Contact Phone Email Fax	Date Time Initials	Contact	Phone Email Fax	Date Time Initials

## Attachment I

### Key to Count Sheets Count Sheets Analytical Procedures

Structures identifications consist of an Asbestos Type followed by a Structure Type

#### Asbestos Type

A = Amosite  
An = Anthophyllite  
C = Chrysotile  
Cr = Crocidolite  
T = Tremolite

#### Structure Types

F = Fiber  
B = Bundle  
C = Cluster  
M = Matrix

ND = no structures detected  
M = other structure associated with a matrix  
NAM = Non Asbestos Mineral  
XGB = partly obscured by a grid bar

#### Sizing Conversion

1 length unit = 5 mm on screen = 0.278 micron

1.80 length units = 0.5 micron

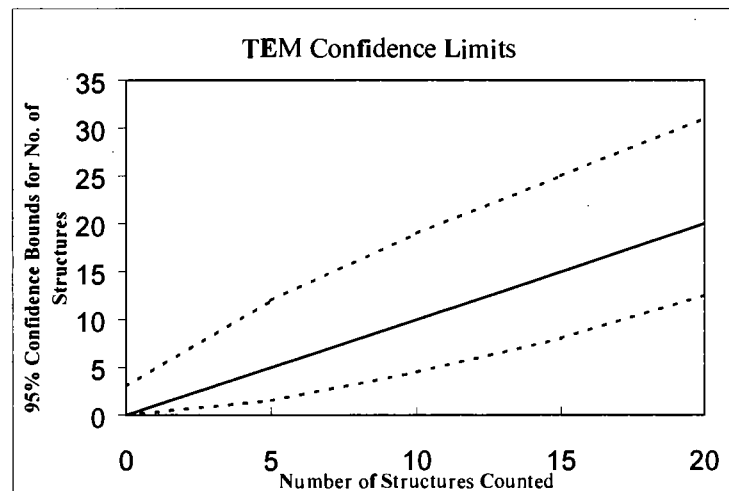
18.0 length units = 5 microns

1 width unit = 1 mm on screen = 0.0556 micron

#### TEM Analysts

Jeanne S. Orr  
Nathan DelHiero  
Angela Heitger  
Jonathan Bernard

Paul D. LoScalzo  
Mark Steiner  
Norberto Zimbleman  
Robert Workman



Upper and lower 95% confidence bounds for the number of structures counted assuming a Poisson distribution.

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 CX N/S
Voltage (KV)	100 KV
Magnification	20KX 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	910
Date received by lab	9-28-11
Lab Job Number	221469
Lab Sample Number	802147

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Analyzed by	AH
Analysis date	9-28-11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scope Alignment	Data Analyzed

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	H5-3	ND												
	G5-6	ND												
	G5-3	ND												
	F5-6	ND												
B	E5-6	ND												
	E5-3	ND												
	C5-6	ND												
	C5-3	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 CX N(S)
Voltage (KV)	100 KV
Magnification	<del>20KX</del> 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	910
Date received by lab	9-28-11
Lab Job Number:	221469
Lab Sample Number:	802148

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Analyzed by	AH
Analysis date	9-28-11
Method (O=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	E3-3	ND												
	C3-6	ND												
	E4-4	ND												
	E4-1	ND												
B	F4-1	ND												
	E4-4	ND												
	E4-1	ND												
	C4-4	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 CX N/S
Voltage (KV)	100 KV
Magnification	20KX 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client :	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	908
Date received by lab	9-28-11
Lab Job Number:	221469
Lab Sample Number:	802149

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Analyzed by	AH
Analysis date	9-28-11
Method (D=Direct, i=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

GiM	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	F5-3	ND												
	ES-6	ND												
	ES-3	ND												
	CS-6	ND												
B	G4-6	ND												
	G4-3	ND												
	F4-6	ND												
	F4-3	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

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Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 CX N(S)
Voltage (KV)	100 KV
Magnification	2000( 100X
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 10 =	0.056 um
Primary filter area (mm <sup>2</sup> )	365
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client :	R+R
Sample Type (A=Air, O=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	908
Date received by lab	9-28-11
Lab Job Number:	221469
Lab Sample Number:	802150

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Analyzed by	At
Analysis date	9-28-11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	W/Th		Amphibole	C	NAM		Sketch	Photo	EDS
A	F3-6	ND												
	F3-3	ND												
	E3-6	ND					Prep A: 95% intact			5% debris				
	E3-3	ND					Prep B ~ Prep A							
B	G3-6	ND												
	G3-3	ND												
	F3-6	ND												
	F3-3	ND												

LA = Libby-type amphibole

QA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

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Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 CX N/S
Voltage (KV)	100 KV
Magnification	200X 100X
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	365
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	959
Date received by lab	9-28-11
Lab Job Number	221469
Lab Sample Number	802151

Analyzed by	AH
Analysis date	9-28-11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	W/Th		Amphibole	C	NAM		Sketch	Photo	EDS
A	E3-3	ND												
	C3-6	ND												
	B3-6	ND												
	B3-3	ND												
B	E4-3	ND												
	C4-6	ND												
	C4-3	ND												
	B4-6	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 CX N/S
Voltage (KV)	100 KV
Magnification	200X 100X
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 $\mu$ m
Scale: 1D =	0.056 $\mu$ m
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Content:	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	952
Date received by lab	9-28-11
Lab Job Number:	221469
Lab Sample Number:	802152

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Analyzed by	AH
Analysis date	9-28-11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	H5-4	ND												
	H5-1	ND												
	65-4	ND												
	65-1	ND												
B	H5-6	ND												
	H5-3	ND												
	E5-3	ND												
	C5-6	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

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Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 CX N(S)
Voltage (KV)	100 KV
Magnification	200X 100X
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.058 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	955
Date received by lab	9-28-11
Lab Job Number:	221469
Lab Sample Number:	802153

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Analyzed by	
Analysis date	
Method (D=Direct, I=Indirect, IA=Indirect ashed)	D
Counting rules (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	F3-3	ND												
	E3-6	ND												
	E3-3	ND												
	C3-6	ND												
B	E6-1	ND												
	C6-4	ND												
	C6-1	ND												
	B6-4	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 CX N(S)
Voltage (KV)	100 KV
Magnification	200X 100X
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Content:	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	955
Date received by lab	9-28-11
Lab Job Number:	221469
Lab Sample Number:	802154

Analyzed by	JLB
Analysis date	9/29/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	W/ith		Amphibole	C	NAM		Sketch	Photo	EDS
A	H5-4	ND												
	G5-4	ND												
	F5-4	ND												
	E5-4	ND												
B	G4-3	ND												
	F4-3	ND												
	E4-3	ND												
	F5-3	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 CX N <sup>S</sup>
Voltage (KV)	100 KV
Magnification	200X 100X
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 $\mu$ m
Scale: 1D =	0.056 $\mu$ m
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	824
Date received by lab	9-28-11
Lab Job Number	221469
Lab Sample Number:	802155

Analyzed by	
Analysis date	
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	F4-4	ND												
	E4-4	ND												
	C4-4	ND												
	E3-4	ND												
	C3-4	ND												
B	E3-3	M		1	12	10	CD		✓		<del>Sketch</del>			
	C3-3	ND												
	B3-3	ND												
	C3-1	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

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Reservoir Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 CX N(S)
Voltage (KV)	100 KV
Magnification	200X 100X
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R+R
Sample Type (A=Air, O=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	834
Date received by lab	9-28-11
Lab Job Number:	221469
Lab Sample Number:	802156

Analyzed by	
Analyte date	
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting mles (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EOS
A	E3-6	ND												
	C3-6	ND												
	F5-6	ND												
	E5-6	ND												
	C5-6	ND												
B	F4-1	ND												
	E4-1	ND												
	C4-1	ND												
	E4-6	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

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## Analytical Procedures – AHERA

Transmission electron microscopy/energy dispersive X-ray spectrometry/selected area electron diffraction (TEM/EDX/SAED) was employed in the analysis of the samples, which were collected on 25 mm mixed cellulose ester air filters. A portion of each filter was collapsed with acetone and etched in a plasma asher. The etched filter was then coated with a thin layer of carbon in a carbon side down. The sample was then placed inside a condensation washer and treated with acetone to remove the filter matrix and expose any inert material.

For each sample, enough grid openings on a 200 mesh TEM grid are analyzed to ensure an analytical sensitivity of at least 0.005 structures/cc. A minimum of four grid openings from two preparations are analyzed for each sample. The grid openings are searched for fibrous structures which, if present are analyzed by SAED and/or EDX (elemental analysis). The AHERA protocol requires SAED confirmation of enough chrysotile asbestos structures on each sample to cause the sample to exceed 70 structures/mm<sup>2</sup> (usually 4 or 5 structures). Both SAED and EDX confirmation are required of enough amphibole structures on each sample to cause the sample to exceed 70 structures/mm<sup>2</sup> (usually 4 or 5 structures) per sample. Either SAED or EDX is required for the remaining asbestos structures of either type. The morphology of each structure is determined and the length and the diameter of any asbestos structures are recorded. Asbestos fibers, bundles, cluster and matrices were identified and recorded. The asbestos structures have been defined in AHERA as follows:

<b>Fiber:</b>	is a structure having a minimum length greater than or equal to 0.5 micron with an aspect ratio of 5:1 or greater with substantially parallel sides.
<b>Bundle:</b>	is a structure composed of three or more fibers in parallel arrangement, with each fiber closer than the diameter of one fiber.
<b>Cluster:</b>	is a structure with fibers in random arrangements such that all fibers are intermixed and no single fiber is isolated from the group.
<b>Matrix:</b>	is a fiber or fibers with one end free and the other end embedded or hidden by a particulate. The exposed fiber end must meet the fiber definition given above.

If more than 50 asbestos structures are identified and confirmed on a sample, AHERA analysis may be terminated after completion of the grid opening, which contains the 50<sup>th</sup> structure. AHERA protocol requires the laboratory to reject any clearance sample which contains in excess of 25% total particulate loading or which appears to be unevenly loaded.

The AHERA protocol includes specific sampling requirements, including minimum numbers of samples and minimum air volumes. Specifically, the 70 structures/mm<sup>2</sup> clearance criteria is only allowed for sets five inside samples (collected in a group of 13 samples including: five outsides and three blanks) with volumes greater than 1200 liters (40 CFR Part 763, page 41894). Deviation from the AHERA sampling protocol may affect the validity of the analytical results. Analysis of samples collected by non-protocol methods are not accredited by NVLAP

### Equations Used for Calculations

$$\text{Area Analyzed, mm}^2 = \# \text{ GO counted} \times \text{Average GO Area (mm)}$$

$$\text{Concentration, s/cc} = \frac{\# \text{ Asbestos Structures}}{\# \text{ GO Counted}} \times \frac{i}{\text{Volume (L)}} \times \frac{\text{Eff. Filter Area (mm}^2\text{)}}{\text{Average GO area (mm}^2\text{)}} \times \frac{1\text{L}}{1000\text{cc}}$$

$$\text{Filter loading, s/mm}^2 = \frac{\# \text{ Asbestos structures}}{\text{Area Analyzed (mm}^2\text{)}}$$

GO = TEM grid opening



# **Reservoirs Environmental, Inc.**

September 30, 2011

Laboratory Code: RES  
Subcontract Number: NA  
Laboratory Report: RES 221575-1  
Project # / P.O. #: None Given  
Project Description: None Given

David Roskelley  
R & R Environmental  
47 West 9000 South #2  
Sandy UT 84070

Dear Customer,

Reservoirs Environmental, Inc. is an analytical laboratory accredited for the analysis of Industrial Hygiene and Environmental matrices by the National Voluntary Laboratory Accreditation Program (NVLAP), Lab Code 101896-0 for Transmission Electron Microscopy (TEM) and Polarized Light Microscopy (PLM) analysis and the American Industrial Hygiene Association (AIHA), Lab ID 101533 - Accreditation Certificate #480 for Phase Contrast Microscopy (PCM) analysis. This laboratory is currently proficient in both Proficiency Testing and PAT programs respectively.

Reservoirs Environmental, Inc. has analyzed the following samples for asbestos content as per your request. The analysis has been completed in general accordance with the appropriate methodology as stated in the attached analysis table. The results have been submitted to your office.

RES 221575-1 is the job number assigned to this study. This report is considered highly confidential and the sole property of the customer. Reservoirs Environmental, Inc. will not discuss any part of this study with personnel other than those of the client. The results described in this report only apply to the samples analyzed. This report must not be used to claim endorsement of products or analytical results by NVLAP or any agency of the U.S. Government. This report shall not be reproduced except in full, without written approval from Reservoirs Environmental, Inc. Samples will be disposed of after sixty days unless longer storage is requested. If you have any questions about this report, please feel free to call 303-964-1986.

Sincerely,

Jeanne Spencer Orr  
President

# RESERVOIRS ENVIRONMENTAL, INC.

NVLAP Lab Code 101896-0; TDH: #30-0015

TABLE I. TEM AIR FILTER SAMPLE DATA AND ANALYTICAL RESULTS

RES Job Number: RES 221575-1  
 Client: R & R Environmental  
 Client Project Number / P.O.: None Given  
 Client Project Description: None Given  
 Date Samples Received: September 29, 2011  
 Analysis Type: TEM, AHERA  
 Turnaround: 24 Hour  
 Date Samples Analyzed: September 29, 2011 - September 30, 2011

Client ID Number	Lab ID Number	Area Analyzed	Air Volume Sampled	Number of Asbestos Structures Detected	Analytical Sensitivity	Asbestos Concentration	Filter Loading
		(mm <sup>2</sup> )	(L)		(s/cc)	(s/cc)	(s/mm <sup>2</sup> )
3W-92711-E	EM 802838	0.0880	1102	ND	0.0040	BAS	BAS
3W-92711-S	EM 802839	0.0770	1096	ND	0.0046	BAS	BAS
3W-92711-N	EM 802840	0.0770	1098	ND	0.0046	BAS	BAS
3W-92711-W	EM 802841	0.0770	1096	ND	0.0046	BAS	BAS
3W-92711-EZS	EM 802842	0.0880	931	ND	0.0047	BAS	BAS
3W-92711-EZE	EM 802843	0.0880	969	ND	0.0045	BAS	BAS

NA = Not Analyzed  
 ND = None Detected  
 BAS = Below Analytical Sensitivity  
 Average Grid Opening in mm<sup>2</sup> = 0.011

Filter Material = Mixed Cellulose Ester  
 Filter Diameter = 25 mm  
 Effective Filter Area = 385 sq mm

Digitally  
 signed by  
 Gina  
 Vettriano  
 Date:  
 2011.09.30  
 09:38:31 -  
 06'00"

DATA QA

# RESERVOIRS ENVIRONMENTAL, INC.

NVLAP Lab Code 101896-0; TDH: #30-0015

TABLE II. SUMMARY OF ANALYTICAL DATA

RES Job Number: RES 221575-1  
 Client: R & R Environmental  
 Client Project Number / P.O.: None Given  
 Client Project Description: None Given  
 Date Samples Received: September 29, 2011  
 Analysis Type: TEM, AHERA  
 Turnaround: 24 Hour  
 Date Samples Analyzed: September 29, 2011 - Sep

Client ID Number	Lab ID Number	Asbestos Mineral	Asbestos Structure Types*				Structures >5 Microns in Length	**Excluded Structures	Asbestos Structures for Concentration
			Fibers	Bundles	Clusters	Matrices			
3W-92711-E	EM 802838	ND	0	0	0	0	0	0	0
3W-92711-S	EM 802839	ND	0	0	0	0	0	0	0
3W-92711-N	EM 802840	ND	0	0	0	0	0	0	0
3W-92711-W	EM 802841	ND	0	0	0	0	0	1**NAM	0
3W-92711-EZS	EM 802842	ND	0	0	0	0	0	0	0
3W-92711-EZE	EM 802843	ND	0	0	0	0	0	0	0

\*See Analytical Procedure for definitions

\*\*C = Excluded from total due to lack of confirmation

\*\*L = Excluded from total for length less than 0.5 micron (AHERA only)

\*\*A = Excluded from total due to incorrect aspect ratio

\*\*NAM = None Asbestos Material

ND = None Detected



Due Date: 9-30  
Due Time: 8:50

RES 221575



# Reservoirs Environmental, Inc.

5801 Logan St. Denver, CO 80216 • Ph: 303 864-1868 • Fax 303-477-4275 • Toll Free: 888 REI-ENV

Pager: 303-609-2088

## INVOICE TO: (IF DIFFERENT)

## CONTACT INFORMATION:

Company: <u>REI</u>	Company:	Contact: <u>Dave Roskelley</u>	Contact:
Address: <u>47 W. 9000 S.</u>	Address:	Phone:	Phone:
<u>Sandy, Ut. 84070</u>		Fax:	Fax:
		Cell/pager: <u>801 541-1035</u>	Cell/pager:
Project Number and/or P.O. #:		Final Date Delivered/Use Email Address:	
Project Description/Location:		<u>dave@reireno.com</u>	

ASBESTOS LABORATORY HOURS: Weekdays: 7am - 7pm		REQUESTED ANALYSIS										VAUD MATRICES		LAB NOTES:							
PLM / PCM / FEI	<input type="checkbox"/> RUSH (Same Day) <input checked="" type="checkbox"/> PRIORITY (Next Day) <input type="checkbox"/> STANDARD (Rush PCM = 2hr, TEM = 6hr.)	PLM - Short report, Long report, Point Count	TEM - AHERA, Level II, 7402, ISO, +/-, Quant, Semi-quant, Micro-vac, ISO-Indirect Preps	PCM - 7400A, 7400B, OSHA	DUST - Total, Respirable	METALS - Analyte(s)	RCRA 8, TCLP, Welding Fume, Metals Scan	ORGANICS - METH	Salmonella: +/-	E. coli O157:H7: +/-	Listeria: +/-	Aerobic Plate Count: +/- or Quantification	E. coli: +/- or Quantification	Coliforms: +/- or Quantification	S. aureus: +/- or Quantification	Y & M: +/- or Quantification	Mold: +/-, Identification, Quantification	SAMPLER'S INITIALS OR OTHER NOTES	Air = A	Bulk = B	
CHEMISTRY LABORATORY HOURS: Weekdays: 8am - 6pm																			Dust = O	Paint = P	
Metal(s) / Oust <input type="checkbox"/> RUSH <input type="checkbox"/> 24 hr. <input type="checkbox"/> 3-5 Day																			Soil = S	Wipe = W	
RCRA 8 / Metals A Welding Fume Scan / TCLP <input type="checkbox"/> RUSH <input type="checkbox"/> 5 day <input type="checkbox"/> 10 day																			Swab = SW	F = Food	
Organics <input type="checkbox"/> 24 hr. <input type="checkbox"/> 3 day <input type="checkbox"/> 5 Day																			Drinking Water = DW	Waste Water = WW	
MICROBIOLOGY LABORATORY HOURS: Weekdays: 9am - 6pm												O = Other									
E. coli O157:H7, Coliforms, S. aureus <input type="checkbox"/> 24 hr <input type="checkbox"/> 2 Day <input type="checkbox"/> 3-5 Day												**ASTM E1702 approved wipe media only**									
Salmonella, Listeria, E. coli, APC, Y & M <input type="checkbox"/> 48 Hr. <input type="checkbox"/> 3-5 Day												Sample Volume (L) / Area	Matrix Code	# Containers	Date Collected mm/dd/yy	Time Collected hh/mm a/p	EM Number (Laboratory Use Only)				
Mold <input type="checkbox"/> RUSH <input type="checkbox"/> 24 Hr <input type="checkbox"/> 48 Hr <input type="checkbox"/> 3 Day <input type="checkbox"/> 5 Day																					
**Turnaround times establish a laboratory priority, subject to laboratory volume and are not guaranteed. Additional fees apply for afterhours, weekends and holidays.**																					
Special Instructions:																					
Client sample ID number (Sample ID's must be unique)																					
1	3W-92711-E																				802838
2	3W-92711-S																				39
3	-N																				40
4	-W																				41
5	-EES																				42
6	-EEE																				43
7																					
8																					
9																					
10																					

Number of samples received: 6 (Additional samples shall be listed on attached long form.)

NOTE: REI will analyze incoming samples based upon information received and will not be responsible for errors or omissions in calculations resulting from the inaccuracy of original data. By signing client/company representative agrees that submission of the following samples for requested analysis as indicated on this Chain of Custody shall constitute an analytical services agreement with payment terms of NET 30 days. Failure to comply with payment terms may result in a 1.5% monthly interest surcharge.

Relinquished By: <u>Justin Kyrie - Fedex</u>	Date/Time: <u>9/27/11</u>	Sample Condition:	On Ice	Sealed	Intact
Laboratory Use Only: <u>Kelly</u>	Date/Time: <u>9-29-11</u>	Temp. (P°)	Yes / No	Yes / No	Yes / No
Received By:	Carrier: <u>Fedex</u>				
Results:	Contact	Phone Email Fax	Date	Time	Initials
	Contact	Phone Email Fax	Date	Time	Initials

TRK # - 7952 3500 8905

## Attachment I

Key to Count Sheets  
Count Sheets  
Analytical Procedures

Structures identifications consist of an Asbestos Type followed by a Structure Type

### Asbestos Type

A = Amosite  
An = Anthophyllite  
C = Chrysotile  
Cr = Crocidolite  
T = Tremolite

### Structure Types

F = Fiber  
B = Bundle  
C = Cluster  
M = Matrix

ND = no structures detected  
M = other structure associated with a matrix  
NAM = Non Asbestos Mineral  
XGB = partly obscured by a grid bar

### Sizing Conversion

1 length unit = 5 mm on screen = 0.278 micron

1.80 length units = 0.5 micron

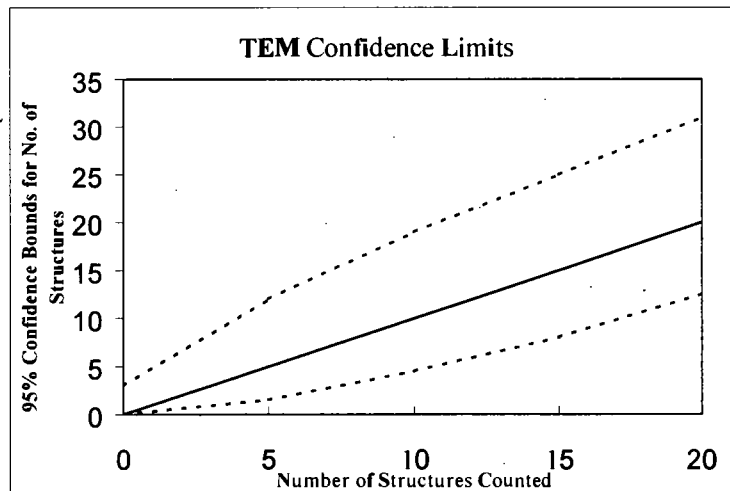
18.0 length units = 5 microns

1 width unit = 1 mm on screen = 0.0556 micron

### TEM Analysts

Jeanne S. Orr  
Nathan DelHiero  
Angela Heitger  
Jonathan Bernard

Paul D. LoScalzo  
Mark Steiner  
Norberto Zimbleman  
Robert Workman



Upper and lower 95% confidence bounds for the number of structures counted assuming a Poisson distribution.

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 N (S)
Voltage (KV)	100 KV
Magnification	20KX 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.05S um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client :	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	1102
Date received by lab	9-29-11
Lab Job Number:	221575
Lab Sample Number:	802838

Analyzed by	AH
Analysis date	9-29-11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	WMth		Amphibole	C	NAM		Sketch	Photo	EDS
A	F3-4	MD												
	F3-1	MD												
	E3-4	MD												
	E3-1	MD												
B	G3-1	MD												
	F3-4	MD												
	F3-1	MD												
	E3-4	MD												

Rev 3-2009

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 N (S)
Voltage (KV)	100 KV
Magnification	20KX 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	1096
Date received by lab	9-29-11
Lab Job Number:	221575
Lab Sample Number:	802839

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Analyzed by	JRB
Analysis date	9/30/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	S
Counting rules (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scooter Alignment	Date Analyzed

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	K4-4	ND												
	44-4	ND					Pump A AB				~80% intact			
	64-4	ND					AB 9/30/11				5-7% debris			
	F4-6	ND												
B	F4-4	ND												
	E4-4	ND												
	C4-4	ND												

Rev 3-2009

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 N (S)
Voltage (KV)	100 KV
Magnification	20KX 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Tyua	

Client:	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	1098
Date received by lab	9-29-11
Lab Job Number:	221575
Lab Sample Number:	802840

Analyzed by	JLB
Analysis date	7/30/11
Method (O=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EOS
A	G4-3	ND												
	F4-3	ND												
	E4-3	ND												
	C4-3	ND												
B	K4-3	ND												
	H4-3	ND												
	G4-3	ND												

Preps A+B ~ 80% asbestos 5-7% debris  
JLB 7/30/11

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 N (S)
Voltage (KV)	100 KV
Magnification	20KX 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	1096
Date received by lab	9-29-11
Lab Job Number:	221575
Lab Sample Number:	802841

Analyzed by	JB
Analysis date	9/30/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	F4-L	ND												
	E4-4	ND												
	G4-6	ND												
	F4-6	ND												
B	F4-1	ND												
	E4-4	F		0	15	12	DX			✓				
	E4-6	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 N (S)
Voltage (KV)	100 KV
Magnification	20KX 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	931
Date received by lab	9-29-11
Lab Job Number:	221575
Lab Sample Number:	802842

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Analyzed by	JPS
Analysis date	9/30/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scoops Alignment	Date Analyzed

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	H4-1	ND												
	G4-1	ND					Imp A 60% in front				3-5% debris			
	F4-1	ND					Imp B 80% in front				3-5% debris			
	E4-6	ND									B 7/30/11			
B	K5-1	ND												
	H5-1	ND												
	G5-1	ND												
	F6-4	ND												

Rev 3-2009

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 N (S)
Voltage (KV)	100 KV
Magnification	20KX 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	969
Date received by lab	9-29-11
Lab Job Number:	221575
Lab Sample Number:	802843

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Analyzed by	JB
Analysis date	9/30/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	Ahera
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EOS
A	H5-1	ND												
	G5-1	ND					Prep A				90% a surf 3-5% debris			
	F5-1	ND					Prep B				60% a surf 3-5% debris			
	E5-1	ND					JB 9/30/11							
B	G3-6	ND												
	H3-6	ND												
	E3-6	ND												
	F3-6	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material



## Analytical Procedures – AHERA

Transmission electron microscopy/energy dispersive X-ray spectrometry/selected area electron diffraction (TEM/EDX/SAED) was employed in the analysis of the samples, which were collected on 25 mm mixed cellulose ester air filters. A portion of each filter was collapsed with acetone and etched in a plasma asher. The etched filter was then coated with a thin layer of carbon in a carbon side down. The sample was then placed inside a condensation washer and treated with acetone to remove the filter matrix and expose any inert material.

For each sample, enough grid openings on a 200 mesh TEM grid are analyzed to ensure an analytical sensitivity of at least 0.005 structures/cc. A minimum of four grid openings from two preparations are analyzed for each sample. The grid openings are searched for fibrous structures which, if present are analyzed by SAED and/or EDX (elemental analysis). The AHERA protocol requires SAED confirmation of enough chrysotile asbestos structures on each sample to cause the sample to exceed 70 structures/mm<sup>2</sup> (usually 4 or 5 structures). Both SAED and EDX confirmation are required of enough amphibole structures on each sample to cause the sample to exceed 70 structures/mm<sup>2</sup> (usually 4 or 5 structures) per sample. Either SAED or EDX is required for the remaining asbestos structures of either type. The morphology of each structure is determined and the length and the diameter of any asbestos structures are recorded. Asbestos fibers, bundles, cluster and matrices were identified and recorded. The asbestos structures have been defined in AHERA as follows:

<b>Fiber:</b>	is a structure having a minimum length greater than or equal to 0.5 micron with an aspect ratio of 5:1 or greater with substantially parallel sides.
<b>Bundle:</b>	is a structure composed of three or more fibers in parallel arrangement, with each fiber closer than the diameter of one fiber.
<b>Cluster:</b>	is a structure with fibers in random arrangements such that all fibers are intermixed and no single fiber is isolated from the group.
<b>Matrix:</b>	is a fiber or fibers with one end free and the other end embedded or hidden by a particulate. The exposed fiber end must meet the fiber definition given above.

If more than 50 asbestos structures are identified and confirmed on a sample, AHERA analysis may be terminated after completion of the grid opening, which contains the 50<sup>th</sup> structure. AHERA protocol requires the laboratory to reject any clearance sample which contains in excess of 25% total particulate loading or which appears to be unevenly loaded.

The AHERA protocol includes specific sampling requirements, including minimum numbers of samples and minimum air volumes. Specifically, the 70 structures/mm<sup>2</sup> clearance criteria is only allowed for sets five inside samples (collected in a group of 13 samples including: five outsides and three blanks) with volumes greater than 1200 liters (40 CFR Part 763, page 41894). Deviation from the AHERA sampling protocol may affect the validity of the analytical results. Analysis of samples collected by non-protocol methods are not accredited by NVLAP

### Equations Used for Calculations

$$\text{Area Analyzed, mm}^2 = \# \text{ GO counted} \times \text{Average GO Area (mm)}$$

$$\text{Concentration, s/cc} = \frac{\# \text{ Asbestos Structures}}{\# \text{ GO Counted}} \times \frac{i}{\text{Volume (L)}} \times \frac{\text{Eff. Filter Area (mm}^2\text{)}}{\text{Average GO area (mm}^2\text{)}} \times \frac{IL}{1000\text{cc}}$$

$$\text{Filter loading, s/mm}^2 = \frac{\# \text{ Asbestos structures}}{\text{Area Analyzed (mm}^2\text{)}}$$

$$\text{GO} = \text{TEM grid opening}$$

Due Date: 10.4  
Due Time: 930

**REI LAB** **Reservoirs Environmental, Inc.**

5801 Logan St. Denver, CO 80216 • Ph: 303-584-1886 • Fax 303-477-4275 • Toll Free: 866-REI-ENV

Pager: 303-606-2088

RES 221773

**INVOICE TO: (IF DIFFERENT)**

**CONTACT INFORMATION:**

Company: <u>REI</u>	Company:	Contact: <u>Dave Rockelley</u>	Contact:
Address:	Address:	Phone:	Phone:
		Fax:	Fax:
		Cell/pager: <u>801 541-1035</u>	Cell/pager:
Project Number and/or P.O. #:	Final Date the variable Email Address:		
Project Description/Location: <u>3rd West Sub Rocky Mtn. Power</u>	<u>dave@reilab.com</u>		

ASBESTOS LABORATORY HOURS: Weekdays: 7am - 7pm		REQUESTED ANALYSIS												VALID MATRIX CODES		LAB NOTES:							
PLM / PCM / TEM <u>TEM</u> <u>RUSH</u> (Same Day) <u>PRIORITY</u> (Next Day) <u>STANDARD</u> (Rush PCM = 2hr, TEM = 6hr.)														Air = A	Bulk = B								
CHEMISTRY LABORATORY HOURS: Weekdays: 8am - 8pm														Dust = O	Paint = P								
Metal(s) / Dust <u>RUSH</u> 24 hr. <u>3-5 Day</u>														Soil = S	Wpe = W								
RCRA 8 / Metals & Welding <u>RUSH</u> 5 day <u>10 day</u>														Swab = SW	F = Food								
Fume Scan / TCLP														Drinking Water = DW	Waste Water = WW								
Organics <u>24 hr.</u> <u>S day</u> <u>S day</u>														O = Other									
MICROBIOLOGY LABORATORY HOURS: Weekdays: 8am - 8pm														**ASTM E1792 approved wipe media only**									
E.coli O157:H7, Coliforms, S.aureus <u>24 hr.</u> <u>2 Day</u> <u>3-5 Day</u>														Sample Volume (L) / Area	Matrix Code	# Containers	Date Collected m/d/y	Time Collected h/m a/p	EM Number (Laboratory Use Only)				
Salmonella, Listeria, E.coli, APC, Y & M <u>48 Hr.</u> <u>3-5 Day</u>																							
Mold <u>RUSH</u> 24 Hr <u>48 Hr</u> <u>3 Day</u> <u>6 Day</u>																							
**Turnaround times stated list a laboratory priority, subject to laboratory volume and are not guaranteed. Additional fees apply for afterhours, weekends and holidays.**																							
Special Instructions:																							
Client sample ID number (Sample ID's must be unique)		PLM - Short report, Point Count	TEM - AHERA, Level II, 7402, ISO, +/-, Quant, Semi-quant, Micro-rec, ISO-Indirect Preps	PCM - 7400A, 7400B, OSHA	DUST - Total, Respirable	METALS - Analysis(s)	RCRA 8, TCLP, Welding Fume, Metals Scan	ORGANICS - METH	Salmonella: +/-	E.coli O157:H7: +/-	Listeria: +/-	Aerobic Plate Count: +/- or Quantification	E.coli +/- or Quantification	Coliforms: +/- or Quantification	S.aureus: +/- or Quantification	Y & M: +/- or Quantification	Mold: +/-, Identification, Quantification	SAMPLER'S INITIALS OR OTHER NOTES					
1	3W-92811-E		X																742 A	9/28/11		804177	
2	3W-92811-S																		742			78	
3	3W-92811-N																		742			79	
4	3W-92811-W																		742			80	
5	3W-92911-E																		927	9/29/11		81	
6	3W-92911-S																		923			82	
7	3W-92911-N (Field) Field Blank																					83	
8	3W-92911-W																		921			84	
9																							
10																							

Number of samples received: \_\_\_\_\_ (Additional samples shall be listed on attached long form.)

NOTE: REI will analyze incoming samples based upon information received and will not be responsible for errors or omissions in calculations resulting from the inaccuracy of original data. By signing client/company representative agrees that submission of the following samples for requested analysis as indicated on this Chain of Custody shall constitute an analytical services agreement with payment terms of NET 30 days, failure to comply with payment terms may result in a 1.8% monthly interest surcharge.

Relinquished By: <u>[Signature]</u> - Fed-Ex		Date/Time: <u>9/29/11</u>		Sample Condition: On ice Sealed Intact										
Laboratory Use Only		Date/Time: <u>10-3-11</u>		Temp. (F°) <u>9:30</u> <u>Canter</u> <u>Fed-Ex</u>										
Received By: <u>Kaelley</u>				Yes / No Yes / No Yes / No										
Results:	Contact	Phone	Email	Fax	Date	Time	Initials	Contact	Phone	Email	Fax	Date	Time	Initials
	Contact	Phone	Email	Fax	Date	Time	Initials	Contact	Phone	Email	Fax	Date	Time	Initials

## Attachment I

Key to Count Sheets  
Count Sheets  
Analytical Procedures

Structures identifications consist of an Asbestos Type followed by a Structure Type

### Asbestos Type

A = Amosite  
An = Anthophyllite  
C = Chrysotile  
Cr = Crocidolite  
T = Tremolite

### Structure Types

F = Fiber  
B = Bundle  
C = Cluster  
M = Matrix

ND = no structures detected  
M = other structure associated with a matrix  
NAM = Non Asbestos Mineral  
XGB = partly obscured by a grid bar

### Sizing Conversion

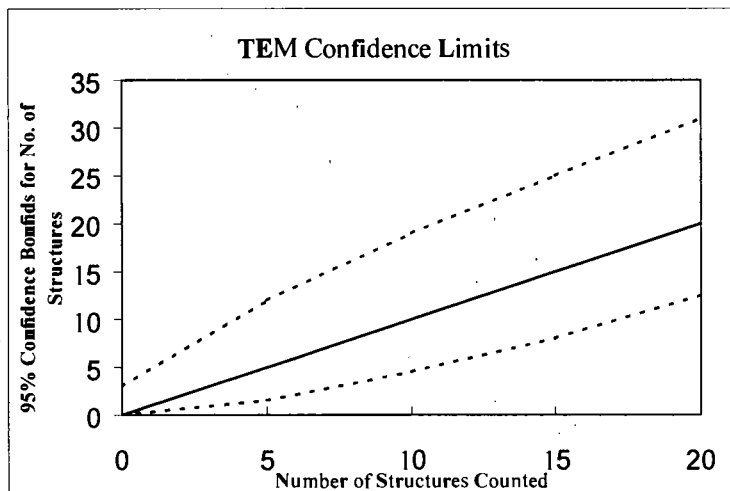
1 length unit = 5 mm on screen = 0.278 micron  
1.80 length units = 0.5 micron  
18.0 length units = 5 microns

1 width unit = 1 mm on screen = 0.0556 micron

### TEM Analysts

Jeanne S. Orr  
Nathan DelHiero  
Angela Heitger  
Jonathan Bernard

Paul D. LoScalzo  
Mark Steiner  
Norberto Zimbleman  
Robert Workman



Upper and lower 95% confidence bounds for the number of structures counted assuming a Poisson distribution.

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100(N) S
Voltage (KV)	100 KV
Magnification	20KX 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	792
Date received by lab	10/3/11
Lab Job Number:	221773
Lab Sample Number:	804177

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Analyzed by	JVB
Analysis date	10/4/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	Alt
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	H3-6	ND												
	G3-6	ND					Prep A	70% hematite			3-5% debris			
	F3-6	ND					Prep B ~ A							
	E3-6	ND					JS							
	C3-6	ND					10/4/11							
B	K3-6	ND												
	H3-6	ND												
	G3-6	ND												
	F3-6	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100(N) S
Voltage (KV)	100 KV
Magnification	20KX 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client :	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	792
Date received by lab	10/3/11
Lab Job Number:	221773
Lab Sample Number:	804178

Analyzed by	JVB
Analysis date	10/4/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	Alt
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Wkth		Amphibole	C	NAM		Sketch	Photo	EDS
A	K4-1	ND												
	H4-1	ND					Prep A 90% heart cut				7-10% debris			
	G4-1	ND					Prep B 90% heart cut				7-10% debris			
	F4-1	ND												
	E4-1	ND												
B	G5-1	ND												
	F5-1	ND												
	E5-1	ND												
	C5-1	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100(N) S
Voltage (KV)	100 KV
Magnification	20KX 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: IL =	0.28 um
Scale: ID =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	792
Date received by lab	10/3/11
Lab Job Number:	221773
Lab Sample Number:	804179

Analyzed by	JVB
Analysis date	10/4/11
Method (D=Direct, I=Indirect, IA=Indirect ashed)	D
Counting rules (ISO, AHERA, ASTM)	Alt
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	G4-1	ND												
	F4-1	ND												
	E4-1	ND					Prep A	90% ambient	3	-7% debris				
	C4-1	ND					Prep B	50% ambient	3	-7% debris				
	B4-1	ND												
B	G5-6	ND												
	G5-3	ND												
	F5-6	ND												
	F5-3	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100(N) S
Voltage (KV)	100 KV
Magnification	20KX 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	Par
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	792
Date received by lab	10/3/11
Lab Job Number:	221773
Lab Sample Number:	804180

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Analyzed by	JM
Analysis date	10/4/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	AH
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	K4-3	ND												
	H4-3	ND												
	G4-3	ND					Prep A				7-10% debris			
	F4-3	ND					Prep B				7-10% debris			
	E4-3	ND												
B	G3-3	ND												
	F3-3	ND												
	G4-1	ND												
	F4-1	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100(N) S
Voltage (KV)	100 KV
Magnification	20KX 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	Par
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	927
Date received by lab	10/3/11
Lab Job Number:	221773
Lab Sample Number:	804181

Analyzed by	JM
Analysis date	10/4/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	AH
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	H4-4	ND												
	G4-4	ND												
	F4-4	ND												
	E4-4	ND												
B	H3-6	ND												
	G3-6	ND												
	F3-6	ND												
	JMS 10/4/11 E3-6	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material



Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100(N) S
Voltage (KV)	100 KV
Magnification	200X 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client :	PAR
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	92.3
Date received by lab	10/3/11
Lab Job Number	221773
Lab Sample Number:	804187

Analyzed by	JM
Analysis date	10/4/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	AH
Grid storage location	Month Analyzed
Scope Allentment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	K4-3	ND												
	H4-3	ND												
	G4-3	ND												
	F4-3	ND												
B	H4-6	ND												
	G4-6	ND												
	F4-6	ND												
	E4-6	ND												

Rev 8-2009

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Resenroire Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100(N) S
Voltage (KV)	100 KV
Magnification	20KX 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	REI
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	921
Date received by lab	10/3/11
Lab Job Number:	221773
Lab Sample Number:	804184

Analyzed by	JMB
Analysis date	10/4/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	AH
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	WMth		Amphibole	C	NAM		Sketch	Photo	EDS
A	H5-1	ND												
	G5-1	ND												
	F5-1	ND												
	E5-1	ND												
	C5-1	ND												
B	F4-6	ND												
	E4-6	ND												
	C4-6	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

O = Chrysotile

NAM = Non-asbestos material

## Analytical Procedures – AHERA

Transmission electron microscopy/energy dispersive X-ray spectrometry/selected area electron diffraction (TEM/EDX/SAED) was employed in the analysis of the samples, which were collected on 25 mm mixed cellulose ester air filters. A portion of each filter was collapsed with acetone and etched in a plasma asher. The etched filter was then coated with a thin layer of carbon in a carbon side down. The sample was then placed inside a condensation washer and treated with acetone to remove the filter matrix and expose any inert material.

For each sample, enough grid openings on a 200 mesh TEM grid are analyzed to ensure an analytical sensitivity of at least 0.005 structures/cc. A minimum of four grid openings from two preparations are analyzed for each sample. The grid openings are searched for fibrous structures which, if present are analyzed by SAED and/or EDX (elemental analysis). The AHERA protocol requires SAED confirmation of enough chrysotile asbestos structures on each sample to cause the sample to exceed 70 structures/mm<sup>2</sup> (usually 4 or 5 structures). Both SAED and EDX confirmation are required of enough amphibole structures on each sample to cause the sample to exceed 70 structures/mm<sup>2</sup> (usually 4 or 5 structures) per sample. Either SAED or EDX is required for the remaining asbestos structures of either type. The morphology of each structure is determined and the length and the diameter of any asbestos structures are recorded. Asbestos fibers, bundles, cluster and matrices were identified and recorded. The asbestos structures have been defined in AHERA as follows:

- Fiber:** is a structure having a minimum length greater than or equal to 0.5 micron with an aspect ratio of 5:1 or greater with substantially parallel sides.
- Bundle:** is a structure composed of three or more fibers in parallel arrangement, with each fiber closer than the diameter of one fiber.
- Cluster:** is a structure with fibers in random arrangements such that all fibers are intermixed and no single fiber is isolated from the group.
- Matrix:** is a fiber or fibers with one end free and the other end embedded or hidden by a particulate. The exposed fiber end must meet the fiber definition given above.

If more than 50 asbestos structures are identified and confirmed on a sample, AHERA analysis may be terminated after completion of the grid opening, which contains the 50<sup>th</sup> structure. AHERA protocol requires the laboratory to reject any clearance sample which contains in excess of 25% total particulate loading or which appears to be unevenly loaded.

The AHERA protocol includes specific sampling requirements, including minimum numbers of samples and minimum air volumes. Specifically, the 70 structures/mm<sup>2</sup> clearance criteria is only allowed for sets five inside samples (collected in a group of 13 samples including: five outsides and three blanks) with volumes greater than 1200 liters (40 CFR Part 763, page 41894). Deviation from the AHERA sampling protocol may affect the validity of the analytical results. Analysis of samples collected by non-protocol methods are not accredited by NVLAP

### Equations Used for Calculations

$$\text{Area Analyzed, mm}^2 = \# \text{ GO counted} \times \text{Average GO Area (mm)}$$

$$\text{Concentration, s/cc} = \frac{\# \text{ Asbestos Structures}}{\# \text{ GO Counted}} \times \frac{1}{\text{Volume (L)}} \times \frac{\text{Eff. Filter Area (mm}^2\text{)}}{\text{Average GO area (mm}^2\text{)}} \times \frac{1 \text{ L}}{1000 \text{ cc}}$$

$$\text{Filter loading, s/mm}^2 = \frac{\# \text{ Asbestos structures}}{\text{Area Analyzed (mm}^2\text{)}}$$

$$\text{GO} = \text{TEM grid opening}$$

# **Reservoirs Environmental, Inc.**

October 6, 2011

Laboratory Code: RES  
Subcontract Number: NA  
Laboratory Report: RES 221950-1  
Project # / P.O. #: None Given  
Project Description: Rocky Mtn. Power 3rd  
West Sub Station

David Roskelley  
R & R Environmental  
47 West 9000 South #2  
Sandy UT 84070

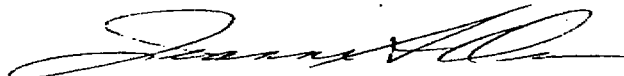
Dear Customer,

Reservoirs Environmental, Inc. is an analytical laboratory accredited for the analysis of Industrial Hygiene and Environmental matrices by the National Voluntary Laboratory Accreditation Program (NVLAP), Lab Code 101896-0 for Transmission Electron Microscopy (TEM) and Polarized Light Microscopy (PLM) analysis and the American Industrial Hygiene Association (AIHA), Lab ID 101533 - Accreditation Certificate #480 for Phase Contrast Microscopy (PCM) analysis. This laboratory is currently proficient in both Proficiency Testing and PAT programs respectively.

Reservoirs Environmental, Inc. has analyzed the following samples for asbestos content as per your request. The analysis has been completed in general accordance with the appropriate methodology as stated in the attached analysis table. The results have been submitted to your office.

RES 221950-1 is the job number assigned to this study. This report is considered highly confidential and the sole property of the customer. Reservoirs Environmental, Inc. will not discuss any part of this study with personnel other than those of the client. The results described in this report only apply to the samples analyzed. This report must not be used to claim endorsement of products or analytical results by NVLAP or any agency of the U.S. Government. This report shall not be reproduced except in full, without written approval from Reservoirs Environmental, Inc. Samples will be disposed of after sixty days unless longer storage is requested. If you have any questions about this report, please feel free to call 303-964-1986.

Sincerely,



Jeanne Spencer Orr  
President

# RESERVOIRS ENVIRONMENTAL, INC.

NVLAP Lab Code 101896-0; TDH: #30-0015

**TABLE I. TEM AIR FILTER SAMPLE DATA AND ANALYTICAL RESULTS**

RES Job Number: RES 221950-1  
 Client: R & R Environmental  
 Client Project Number / P.O.: None Given  
 Client Project Description: Rocky Mtn. Power 3rd West Sub Station  
 Date Samples Received: October 5, 2011  
 Analysis Type: TEM, AHERA  
 Turnaround: 24 Hour  
 Date Samples Analyzed: October 5, 2011 - October 6, 2011

Client ID Number	Lab ID Number	Area Analyzed (mm <sup>2</sup> )	Air Volume Sampled (L)	Number of Asbestos Structures Detected	Analytical Sensitivity (s/cc)	Asbestos Concentration (s/cc)	Filter Loading (s/mm <sup>2</sup> )
3W-93011-E	EM 805791	0.1100	694	ND	0.0050	BAS	BAS
3W-93011-S	EM 805792	0.1100	694	ND	0.0050	BAS	BAS
3W-93011-N	EM 805793	0.1100	694	ND	0.0050	BAS	BAS
3W-93011-W	EM 805794	0.1100	694	ND	0.0050	BAS	BAS
3W-100311-S	EM 805795	0.0880	950	ND	0.0046	BAS	BAS
3W-100311-W	EM 805796	0.0880	868	ND	0.0050	BAS	BAS
3W-100311-E	EM 805797	0.0880	939	ND	0.0047	BAS	BAS
3W-100311-N	EM 805798	0.0880	939	ND	0.0047	BAS	BAS

NA = Not Analyzed

ND = None Detected

BAS = Below Analytical Sensitivity

Average Grid Opening in mm<sup>2</sup> = 0.011

Filter Material = Mixed Cellulose Ester

Filter Diameter = 25 mm

Effective Filter Area = 385 sq mm

Digitally  
signed by  
Gina Vetrone  
Date:  
2011.10.06  
09:08:53  
0000

DATA QA

Due Date: 10-6  
Due Time: 8:35

RES 221950

**RESERVAIRS Environmental, Inc.**  
8631 Logan St. Denver, CO 80216 • Ph: 303-964-1866 • Fax 303-477-4275 • Toll Free: 888-RESI-ENV  
Pager: 303-909-2098

**INVOICE TO: (IF DIFFERENT)**

**CONTACT INFORMATION:**

Company: <b>R &amp; R Environmental</b>	Company:	Contact: <b>Dave Roskelley</b>	Contact: <b>Justin Kargis</b>
Address: <b>47 W. 9000 S</b>	Address:	Phone:	Phone:
<b>Sandy, UT 84070</b>		Fax:	Fax:
		Cellpager: <b>801 541-1035</b>	Cellpager: <b>801 828-5219</b>
Project Number and/or P.O. #:		Final Dam Deliverable Email Address:	
Project Description/Location: <b>Rocky Mtn Power 3<sup>rd</sup> West Sub Station</b>			

ASBESTOS LABORATORY HOURS: Weekdays: 7am - 7pm		REQUESTED ANALYSIS												VAUD MATRIX CODES		LAB NOTES:						
PLM / PCM / TEM	RUSH (Same Day) <input checked="" type="checkbox"/> PRIORITY (Next Day) <input type="checkbox"/> STANDARD (Rush PCM = 2hr, TEM = 6hr.)	PLM - Short report, Long report, Point Count	TEM - AHERA, Level II, 7402, ISO, +/-, Quant, Semi-quant, Micro-vac, ISO-Indirect Procs	PCM - 7400A, 7400B, OSHA	DUST - Total, Respirable	METALS - Analysis	RCRA 8, TCLP, Welding Fume, Metals Scan	ORGANICS - METH	Salmonella: +/-	E.coli O157:H7: +/-	Listeria: +/-	Aerobic Plate Count: +/- or Quantification	E.coli: +/- or Quantification	Coliforms: +/- or Quantification	S aureus: +/- or Quantification	Y & M: +/- or Quantification	Mold: +/- Identification, Quantification	SAMPLES INITIALS OR OTHER NOTES	Alr = A	Bulk = B		
CHEMISTRY LABORATORY HOURS: Weekdays: 8am - 6pm																			Dust = D	Paint = P		
Metal(s) / Ouat RUSH 24 hr. 3-5 Day																			Soil = S	Wipe = W		
RCRA 8 / Metals & Welding Fume Scan / TCLP RUSH 5 day 10 day																			Swab = SW	F = Food		
Organics 24 hr. 3 day 5 Day																			Drinking Water = OW	Waste Water = WW		
MICROBIOLOGY LABORATORY HOURS: Weekdays: 9am - 5pm														O = Other								
E.coli O157:H7, Coliforms, S.aureus 24 hr. 2 Day 3-5 Day														**ASTM E1782 approved wipe media only**								
Salmonella, Uetaria, E.coli, APC, Y & M 48 Hr. 3-5 Day														Sample Volume (L) / Area	Matrix Code	# Containers	Date Collected mm/dd/yyyy	Time Collected hh/mm alp	EM Number (Laboratory Use Only)			
Mold RUSH 24 Hr 48 Hr 3 Day 5 Day																						
**Turnaround times establish a laboratory priority, subject to laboratory volume and are not guaranteed. Additional fees apply for offhours, weekends and holidays.**																						
Special Instructions:																						
Client sample ID number (Sample ID's must be unique)																						
1	3W-93011-E		X															694	A	9/30/11		805791
2	3W-93011-S																	694				92
3	3W-93011-N																	694				93
4	3W-93011-W																	694				94
5	3W-100311-S																	950		10/3/11		95
6	3W-100311-W																	808				96
7	3W-100311-E																	939				97
8	3W-100311-N																	939				98
9																						
10																						

Number of samples received: (Additional samples shall be listed on attached long form.)

NOTE: RES will analyze incoming samples based upon information received and will not be responsible for errors or omissions in calculations resulting from the inaccuracy of original data. By signing, client/agency representative agrees that submission of the following samples for requested analysis as indicated on this Chain of Custody shall constitute an analytical services agreement with payment terms of NET 30 days, failure to comply with payment terms may result in a 1.5% monthly interest surcharge.

Relinquished By: <b>Justin Kargis - FedEx</b>	Date/Time: <b>10/3/11</b>	Sample Condition: On Ice Sealed Intact
Laboratory Use Only		Temp. (F°) Yes / No Yes / No Yes / Mn
Received By: <b>Kargis</b>	Date/Time: <b>10-5-11</b>	Carrier: <b>FedEx</b>
Results:	Contact Phone Email Fax Date Time Initials	Contact Phone Email Fax Date Time Initials
	Contact Phone Email Fax Date Time Initials	Contact Phone Email Fax Date Time Initials

TDK# 7975 8581 5271

## Attachment I

Key to Count Sheets  
Count Sheets  
Analytical Procedures

Structures identifications consist of an Asbestos Type followed by a Structure Type

### Asbestos Type

A = Amosite  
An = Anthophyllite  
C = Chrysotile  
Cr = Crocidolite  
T = Tremolite

### Structure Types

F = Fiber  
B = Bundle  
C = Cluster  
M = Matrix

ND = no structures detected  
M = other structure associated with a matrix  
NAM = Non Asbestos Mineral  
XGB = partly obscured by a grid bar

### Sizing Conversion

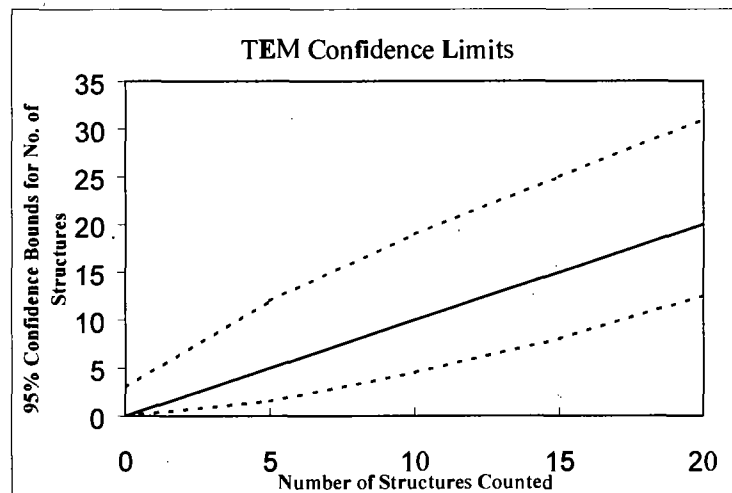
1 length unit = 5 mm on screen = 0.278 micron  
1.80 length units = 0.5 micron  
18.0 length units = 5 microns

1 width unit = 1 mm on screen = 0.0556 micron

### TEM Analysts

Jeanne S. Orr  
Nathan DelHiero  
Angela Heitger  
Jonathan Bernard

Paul D. LoScalzo  
Mark Steiner  
Norberto Zimbleman  
Robert Workman



Upper and lower 95% confidence bounds for the number of structures counted assuming a Poisson distribution.

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100(N)S
Voltage (KV)	100 KV
Magnification	20KX 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 $\mu$ m
Scale: 1D =	0.058 $\mu$ m
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client :	R&R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	694
Date received by lab	10/5/11
Lab Job Number	221950
Lab Sample Number	805791

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Analyzed by	JB
Analysis date	10/5/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	A1+
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

10/6/11

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	H4-4	ND												
	H4-4	ND												
	G4-4	ND												
	F4-4	ND												
	E4-4	ND												
B	H4-6	ND												
	G4-6	ND												
	F4-6	ND												
	E4-6	ND												
	C4-6	ND												

LA = Libby-type amphibole

OA = Ottier (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Rev 3-2009



Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 <u>N</u> S
Voltage (KV)	100 KV
Magnification	<u>20KX</u> 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	386
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R&R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	694
Date received by lab	10/5/11
Lab Job Number:	221950
Lab Sample Number:	805792

Analyzed by	JB
Analysis date	10/5/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting miles (ISO, AHERA, ASTM)	AH
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	H6-4	ND												
	G6-4	ND												
	F6-4	ND												
	G5-1	ND												
	F5-1	ND												
B	K4-3	ND												
	H4-3	ND												
	K5-3	ND												
	H5-3	ND												
	F6-3	ND												

Rev 3-2008

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 <u>N</u> S
Voltage (KV)	100 KV
Magnification	<u>20KX</u> 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 10 =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client :	R&R
Sample Type (A=Air, O=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	694
Date received by lab	10/5/11
Lab Job Number:	221950
Lab Sample Number:	805793

Analyzed by	JB
Analysis date	10/9/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	AH
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	E3-4	ND												
	E3-4	ND												
	C3-4	ND												
	B3-4	ND												
	C4-4	ND												
B	G2-3	ND												
	F2-3	ND												
	E2-3	ND												
	C2-3	ND												
	F3-0	ND												

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoir Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 <u>N</u> S
Voltage (KV)	100 KV
Magnification	<u>20KX</u> 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R&R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	694
Date received by lab	10/5/11
Lab Job Number	221950
Lab Sample Number:	805794

Analyzed by	JB
Analysis date	10/5/11
Method (O=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting miles (ISO, AHERA, ASTM)	AH
Grid storage (location)	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	K3-4	ND												
	H3-4	ND												
	G3-4	ND												
	F3-4	ND												
	E3-4	ND												
B	K4-1	ND												
	H4-1	ND												
	G4-1	ND												
	F4-1	ND												
	E4-1	ND												

Rev 3-2003

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 <u>N</u> S
Voltage (KV)	100 KV
Magnification	<u>20KX</u> 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.058 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R&R
Sample Type (A=Ab, D=Oust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	950
Date received by lab	10/5/11
Lab Job Number:	221950
Lab Sample Number:	805795

Analyzed by	JB
Analysis date	10/6/11
Method (D=Direct, I=Indirect, IA=Indirect, eshed)	D
Counting miles (ISO, AHERA, ASTM)	AH
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	G12-4	ND												
	F2-4	ND												
	E2-4	ND												
	C2-4	ND												
B	G3-6	ND												
	F3-6	ND												
	E3-6	ND												
	C5-4	ND												

Prep A 80% content 5% debris  
 Prep B ~50% content 5% debris  
 Anal 10/6/11

Rev 3-2006

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structural Count

Laboratory name:	REI
Instrument	JEOL 100 <u>N</u> S
Voltage (KV)	100 KV
Magnification	<u>20KX</u> 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.058 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client:	R&R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	868
Date received by lab	10/5/11
Lab Job Number:	221950
Lab Sample Number:	805796

Analyzed by	JB
Analysis date	10/6/11
Method (D=Direct, I=Indirect; IA=Indirect, ashed)	D
Counting rules (ISO, AHERA, ASTM)	A1+
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	F4-1	ND												
	E4-1	ND												
	C4-1	ND												
	B4-1	ND												
B	G3-3	ND												
	F3-3	ND												
	E3-3	ND												
	C4-6	ND												

Rev 3-2009

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 <u>N</u> S
Voltage (KV)	100 KV
Magnification	<u>20KX</u> 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 um
Scale: 1D =	0.056 um
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client :	R+R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	939
Date received by lab	10/5/11
Lab Job Number:	221950
Lab Sample Number:	805797

Analyzed by	JB
Analysis date	10/6/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting miles (ISO, AHERA, ASTM)	A1+
Grid storage location	Month Analyzed
Scooter Alignment	Date Analyzed

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibole	C	NAM		Sketch	Photo	EDS
A	G4-1	ND												
	F4-1	ND					Pimp A	90% intact			3-5% debris			
	E4-1	ND					Pimp B	70% intact			35% debris			
	C4-1	ND					Bamf on 6/4							
	B4-1	ND												
B	F4-6	ND												
	E4-6	ND												
	C4-6	ND												

Rev 3-2000

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

Reservoirs Environmental, Inc.  
TEM Asbestos Structure Count

Laboratory name:	REI
Instrument	JEOL 100 <u>N</u> S
Voltage (KV)	100 KV
Magnification	<u>20KX</u> 10KX
Grid opening area (mm <sup>2</sup> )	0.011
Scale: 1L =	0.28 $\mu$ m
Scale: 1D =	0.056 $\mu$ m
Primary filter area (mm <sup>2</sup> )	385
Secondary Filter Area (mm <sup>2</sup> )	
QA Type	

Client :	R&R
Sample Type (A=Air, D=Dust):	A
Air volume (L) or dust area (cm <sup>2</sup> )	939
Date received by lab	10/5/11
Lab Job Number:	221950
Lab Sample Number:	805798

## F-Factor Calculation (Indirect Preps Only):

Fraction of primary filter used	
Total Resuspension Volume (ml)	
Volume Applied to secondary filter (ml)	

Analyzed by	JB
Analysis date	10/6/11
Method (D=Direct, I=Indirect, IA=Indirect, ashed)	D
Counting mics (ISO, AHERA, ASTM)	A1+
Grid storage location	Month Analyzed
Scope Alignment	Date Analyzed

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class			Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		Amphibola	C	NAM		Sketch	Photo	EDS
A	K3-6	ND												
	H3-6	ND												
	G3-6	ND												
	F3-6	ND												
B	G3-4	ND												
	F3-4	ND												
	E3-4	ND												
	C3-4	ND												

Rev 3-2008

LA = Libby-type amphibole

OA = Other (non-Libby type) amphibole

C = Chrysotile

NAM = Non-asbestos material

## Analytical Procedures – AHERA

Transmission electron microscopy/energy dispersive X-ray spectrometry/selected area electron diffraction (TEM/EDX/SAED) was employed in the analysis of the samples, which were collected on 25 mm mixed cellulose ester air filters. A portion of each filter was collapsed with acetone and etched in a plasma asher. The etched filter was then coated with a thin layer of carbon in a carbon side down. The sample was then placed inside a condensation washer and treated with acetone to remove the filter matrix and expose any inert material.

For each sample, enough grid openings on a 200 mesh TEM grid are analyzed to ensure an analytical sensitivity of at least 0.005 structures/cc. A minimum of four grid openings from two preparations are analyzed for each sample. The grid openings are searched for fibrous structures which, if present are analyzed by SAED and/or EDX (elemental analysis). The AHERA protocol requires SAED confirmation of enough chrysotile asbestos structures on each sample to cause the sample to exceed 70 structures/mm<sup>2</sup> (usually 4 or 5 structures). Both SAED and EDX confirmation are required of enough amphibole structures on each sample to cause the sample to exceed 70 structures/mm<sup>2</sup> (usually 4 or 5 structures) per sample. Either SAED or EDX is required for the remaining asbestos structures of either type. The morphology of each structure is determined and the length and the diameter of any asbestos structures are recorded. Asbestos fibers, bundles, cluster and matrices were identified and recorded. The asbestos structures have been defined in AHERA as follows:

- Fiber:** is a structure having a minimum length greater than or equal to 0.5 micron with an aspect ratio of 5:1 or greater with substantially parallel sides.
- Bundle:** is a structure composed of three or more fibers in parallel arrangement, with each fiber closer than the diameter of one fiber.
- Cluster:** is a structure with fibers in random arrangements such that all fibers are intermixed and no single fiber is isolated from the group.
- Matrix:** is a fiber or fibers with one end free and the other end embedded or hidden by a particulate. The exposed fiber end must meet the fiber definition given above.

If more than 50 asbestos structures are identified and confirmed on a sample, AHERA analysis may be terminated after completion of the grid opening, which contains the 50<sup>th</sup> structure. AHERA protocol requires the laboratory to reject any clearance sample which contains in excess of 25% total particulate loading or which appears to be unevenly loaded.

The AHERA protocol includes specific sampling requirements, including minimum numbers of samples and minimum air volumes. Specifically, the 70 structures/mm<sup>2</sup> clearance criteria is only allowed for sets five inside samples (collected in a group of 13 samples including: five outsides and three blanks) with volumes greater than 1200 liters (40 CFR Part 763, page 41894). Deviation from the AHERA sampling protocol may affect the validity of the analytical results. Analysis of samples collected by non-protocol methods are not accredited by NVLAP

### Equations Used for Calculations

$$\text{Area Analyzed, mm}^2 = \# \text{ GO counted} \times \text{Average GO Area (mm)}$$

$$\text{Concentration, s/cc} = \frac{\# \text{ Asbestos Structures}}{\# \text{ GO Counted}} \times \frac{1}{\text{Volume (L)}} \times \frac{\text{Eff. Filter Area (mm}^2\text{)}}{\text{Average GO area (mm}^2\text{)}} \times \frac{1\text{L}}{1000\text{cc}}$$

$$\text{Filter loading, s/mm}^2 = \frac{\# \text{ Asbestos structures}}{\text{Area Analyzed (mm}^2\text{)}}$$

GO = TEM grid opening